101st Congress } SENATE { Exec. Rept.
2d Session } { 101-31

THRESHOLD TEST BAN AND PEACEFUL NUCLEAR EXPLOSIONS TREATIES

September 14, 1990.—Ordered to be printed

Mr. Pell, from the Committee on Foreign Relations, submitted the following

REPORT

[To accompany EX N, 94-2 and Treaty Doc. 101-19]

The Committee on Foreign Relations to which was referred the two treaties between the United States of America and the Union of Soviet Socialist Republics on (1) the Limitation of Underground Weapon Tests, signed in Moscow on July 3, 1974, and (2) Underground Nuclear Explosions for Peaceful Purposes (PNET), signed in Washington and Moscow on May 28, 1976, with an Agreed Statement relating to paragraph 2(c) of Article III of the PNET, signed on May 13, 1976, and the Protocol to the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapons Tests, and the Protocol to the Treaty between the United States of America and the Union of Soviet Socialist Republic on Underground Nuclear Explosions for Peaceful Purposes (the Protocols), both signed at Washington on June 1, 1990, having considered the same, reports favorably thereon with two declarations to the Treaty on the Limitation of Underground Weapon Tests and the Protocol thereto, and recommends that the Senate give its advice and consent to ratification thereof.

I. Purpose and Summary of the Treaties

PURPOSE

The treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests, and the Protocol thereto, referred to as the Threshold Test Ban (TTB Treaty), and the treaty between the United States of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes, and

39-119 ☆(Star Print)

S384-10

the Protocol thereto (PNE Treaty), taken together, will govern the conduct of all underground nuclear explosions by the Parties, those for weapon tests as well as those for peaceful purposes. All nuclear explosions other than underground nuclear explosions are prohibited by the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water (the Limited Test Ban Treaty), which entered into force in 1963.

The TTB Treaty and the PNE Treaty are closely interrelated. The TTB Treaty imposes a yield limitation and other conditions on underground nuclear weapon tests, while the PNE Treaty imposes the identical yield limitation on individual underground nuclear explosions for peaceful purposes and other limitations and conditions on the conduct of underground nuclear explosions for peaceful purposes. The PNE Treaty was negotiated pursuant to Article VIII of the TTB Treaty which provides that the United States and the Soviet Union will negotiate and conclude an agreement governing underground nuclear explosions for peaceful purposes. The two treaties are expressly linked to each other by a number of provisions, including the entry-into-force provision of the PNE Treaty, which provides for the simultaneous exchange of instruments of ratification of both treaties.

PROTOCOLS TRANSMITTED BY PRESIDENT

On June 28, President Bush transmitted to the Senate for its advice and consent to ratification a protocol to the treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests (Threshold Test Ban Treaty, or TTBT), and the protocol to the treaty between the United States of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes (Peaceful Nuclear Explosions Treaty, or PNET). The protocols were signed during the Washington summit meetings on June 1, 1990.

SUMMARY OF THE TTB TREATY AND THE NEW PROTOCOL

The TTB Treaty, including a Protocol which is an integral part thereof, was signed in Moscow on July 3, 1974.

The treaty provides for both a limitation of 150 kilotons on all underground nuclear weapon tests carried out by the Parties and for the exchange of data to ensure verification of compliance by national technical means. The treaty consists of a preamble, five operative articles, and a Protocol.

The new Protocol substantially expands upon the protocol originally negotiated. The protocol provides that, in the case of every nuclear explosion over 50 kilotons conducted by either side, the other side has the right to gain on-site yield measurement through hydrodynamic methods (known as CORRTEX) and the right to confirm geology and hydrodynamic yield measurements. Also in instances of tests over 50 kilotons, each side has the right to use three designated seismic stations. Seismic monitoring or hydrodynamic measurements can be used alone or in combination. On-site inspections are allowed for tests over 50 kilotons if hydrodynamic methods are not used and for tests between 35 and 50 kilotons. In addition, regardless of test yields, each side is allowed to conduct hydrodynamic measurements of up to two tests a year for five years and of a test each year thereafter, unless otherwise agreed.

SUMMARY OF PNE TREATY AND THE NEW PROTOCOL

The PNE Treaty, including a Protocol which is an integral part thereof, was signed in Washington and Moscow on May 28, 1976. An associated Agreed Statement dated May 13, 1976, concerning the treaty was initiated in Moscow, and is included as an attachment to the text of the treaty. In his letter of submittal to the President, Secretary Baker said that,

> ". . . the Agreed Statement relating to paragraph 2(c) of Article III of the PNET, signed on May 13, 1976, and transmitted to the Senate on July 29, 1976, will apply to the PNET as originally contemplated."

This treaty, which was negotiated pursuant to Article III of the TTB Treaty, establishes procedures for the conduct of underground nuclear explosions for peaceful purposes (PNE's), designed to meet the three basic criteria considered essential by the Ford administration for an acceptable agreement:

(1) Underground nuclear explosions for peaceful purposes must not provide weapon-related benefits otherwise precluded by the TTB Treaty;

(2) The fact that PNE activities are not contributing to such benefits must be adequately verifiable; and

(3) The PNE Treaty must be consistent with existing treaty obligations, including, in particular, the Limited Test Ban Treaty.

Negotiation of the PNE Treaty was necessitated by the expressed Soviet interest in providing for a program of underground nuclear explosions for peaceful purposes and the concomitant U.S. desire to obtain effective limitations on nuclear weapon tests. The PNE Treaty is designed to ensure that weapon-related benefits otherwise precluded by the TTB Treaty cannot be obtained by a Party in the course of a PNE program whether the explosions are carried out on its own territory or on the territory of a third state pursuant to an arrangement for providing PNE services to such a third state.

The treaty was negotiated specifically to provide a regime for the conduct of PNE's by nuclear weapons states and it in no way alters the fact that acquisition of nuclear explosive capability, albeit for ostensibly peaceful purposes, by a non-nuclear weapon state would inevitably mean the simultaneous acquisition of a nuclear weapons capability.

The PNE Treaty provides for a limitation of 150 kilotons on all individual underground nuclear explosions for peaceful purposes and for an aggregate yield limitation of 1.5 megatons on group nuclear explosions for such purposes. A group explosion consists of substantially simultaneous individual explosions located within a specified geometrical relationship to one another.

The Protocol sets forth rights to hydrodynamic measurements comparable to those in the TTBT protocol with the significant difference that, since there is no weapons design information to protect, the monitoring can be quite intrusive. Accordingly, the measuring device which is essentially a coaxial cable which gives yield information based on the speed and degree of its melting, is implanted in the same hole as the device rather than in a parallel hole. When hydrodynamic measurement is used and group explosions with an aggregate yield above 150 kilotons is involved, a local seismic network is allowed. On-site inspection is allowed if hydrodynamic measurement is not chosen.

II. BACKGROUND

Following the development of atomic weapons in the early 1940's and their first and only use in 1945 at Hiroshima and Nagasaki, the post-war years were marked by a race between the United States and the Soviet Union to develop, test, and deploy atomic and, later, hydrogen weapons. In the 1950's, Britain and France moved toward creation of their own independent arsenals. Early efforts to turn away from nuclear weapons entirely came to naught, but, under pressure from other nations, the United States, Great Britain, and the Soviet Union, did agree to discuss a comprehensive ban, and a voluntary moratorium on testing came into place in 1958. Although President Eisenhower announced in 1959 that the United States would no longer be bound, and although the French tested, the tripartite moratorium lasted until 1961, when the Soviets tested and the United States tested two weeks later.

Discussions in that period focussed on the concept of a complete ban, but the United States and the Soviet Union could not resolve their differences on various significant matters, including the numbers of annual, on-site inspections and the numbers of control posts and unmanned seismic stations.

LIMITED TEST BAN TREATY OF 1963

By mid-1963, however, it was clear that an agreement might be achievable which did not deal with underground tests, but banned other testing. Accordingly, three power meetings began on July 15, and a treaty, the Limited Test Ban Treaty, was negotiated in 10 days. It prohibits any nuclear weapon test explosion, or any other nuclear explosion by the parties, in the atmosphere, in outer space, and under water. The treaty allows nuclear explosions underground, but only if there will be no radioactive debris outside the territorial limits of the nation conducting the explosion.

The treaty was signed in Moscow on August 5, 1963. On September 24, after extensive hearings and almost 3 weeks of debate, the Senate consented to ratification in an 80–19 vote. President Kennedy ratified the treaty on October 7, and it entered into force on October 10.

THRESHOLD TEST BAN AND PEACEFUL NUCLEAR EXPLOSIONS TREATIES

In 1974, President Nixon signed the Threshold Test Ban Treaty (TTBT), which applied further limits on nuclear testing by restricting underground nuclear weapons tests to an explosive yield of 150 kilotons. However, the specified entry into force was delayed until March 31, 1976, and the treaty was not submitted to the Senate by the President pending negotiation of companion treaty covering peaceful nuclear explosions. The Peaceful Nuclear Explosions

Treaty (PNET) was signed by President Ford in 1976, and he transmitted the two treaties to the Senate late in his term.

In 1977, the Foreign Relations Committee held hearings and, by unanimous vote, ordered the TTB and PNE Treaties reported favorably, but reporting was delayed pending completion of action on and reporting of the Panama Canal Treaties on the calendar. In mid-1978, the Administration concluded that a push to gain Senate consent to ratification of the TTBT and PNET could stir up a fight which would jeopardize the prospects for a complete ban. Accordingly, the Committee voted to reconsider the vote of approval and to return the treaties to the Committee calendar.

Citing customary international law, both sides have committed themselves to observance of the TTB/PNE Treaties for the last decade, although the Reagan administration has reported to Congress that the Soviets have "likely" exceeded the 150 kiloton ceiling on numerous occasions. This contention is disputed by scientists and others who question the accuracy and interpretation of the Administration's yield measurements.

Since the agreements have not been ratified, two important provisions related to verification have not been implemented: (1) provisions under the PNET for on-site monitoring of pre-announced groups of nuclear explosions with an aggregate yield above 150 kilotons; and (2) exchange of data and test calibration information under both treaties that would improve each side's verification confidence level, unless undercut by deception.

COMPREHENSIVE TEST BAN

During the Carter administration the United States, the Soviet Union, and the United Kingdom conducted lengthy negotiations on a CTB. By 1979, almost all issues had been resolved or appeared resolvable. The sides were moving toward agreement that weapons tests would be banned and that a moratorium would be placed indefinitely on so-called peaceful nuclear explosions.

Verification was to be both through international arrangements specified in the treaty and special arrangements among the United States, the Soviet Union, and the United Kingdom. The treaty provided for verification by National Technical Means (NTM), as well as an international exchange of seismic data. Any participant could request an on-site inspection of a suspicious event, which could either be granted or the event could be explained. In the case of the original three parties, it was agreed that ten stations would be located in both the Soviet Union and the United States. The number of seismic stations to be placed in Britain was not resolved. The three countries could also request inspections that would have to be granted unless explanations were provided. Denials of inspection demands would have to be taken into account in assessing a party's compliance record.

In a major effort to gain JCS, DOD, and DOE support for the emerging treaty, President Carter shortened the proposed initial duration of the treaty from five to three years, thereby reducing the period of time during which the United States would not be able to conduct reliability or developmental testing for its nuclear weapons programs. After heated dispute, a decision was made that the treaty should automatically expire at the end of three years unless renegotiated. Differences within the government were never resolved as to whether the United States should only retain the option to resume testing or should commit itself in advance to renewed testing. In 1979 and 1980, the test ban issue was overshadowed by SALT. The test ban negotiations continued at a low level pending the outcome of SALT II ratification until the end of the Carter administration.

THE REAGAN ADMINISTRATION POSITION

Reversing the position of previous administrations, the Reagan administration decided in 1981 not to resume the tripartite CTB negotiations. ACDA Director Eugene Rostow declared that, while a CTB would remain a "long-term objective" of the United States, the verification problems associated with such an accord were probably insurmountable in the near term. Subsequently, it became clear that verification was not the only Administration concern.

With regard to the TTBT and PNET, the Reagan administration, after extended review, decided in June, 1982 that no ratification was possible unless the Soviets agreed to expanded TTBT provisions on verification. Until 1986, the Soviets rejected U.S. requests for discussions on expanded provisions, arguing that any discussion of new provisions should follow, and not precede, ratification.

In the fall of 1986, as President Reagan left for the Reykjavik summit, a Conference Committee was considering different nuclear testing provisions contained in each chamber's version of the Defense Department authorization bill. The House provision would have bound the United States to a one-year moratorium on nuclear tests over one kiloton under certain conditions. The Senate's version called for ratification of the TTBT and PNET and resumption of talks on a Comprehensive Test Ban (CTB).

To break the impasse on the defense bill and to leave the President free to deal with General Secretary Gorbachev, a compromise was reached. The Conference Committee accepted the Senate provision in exchange for presidential assurances. The President agreed on October 10, 1986, to:

> . . . make ratification of these treaties a first order of business for the Congress, with an appropriate reservation to the treaties that would ensure they would not take effect until they are effectively verifiable. I will work with the Senate in drafting this reservation.
>
> Second, I intend to inform the General Secretary in Reykjavik that, once our verification concerns have been satisfied and the treaties have been ratified, I will propose that the United States and the Soviet Union immediately engage in negotiations on ways to implement a step-by-step parallel program—in association with a program to reduce and eliminate all nuclear weapons—of limiting and ultimately ending nuclear testing.

EARLIER COMMITTEE CONSIDERATION AND APPROVAL

Pursuant to this commitment, the President asked the Senate to consider the treaties anew, and Chairman Pell held two hearings in January 1987. It developed that the Administration officials favored a dual ratification scheme under which the Senate would give its advice and consent to ratification of the two treaties, but the President would not ratify until new verification protocols had been negotiated and the Senate had advised and consented to the ratification of the two protocols.

Following the hearings, a number of Senators suggested to the Administration that it should suffice to have the Senate give its advice and consent with the requirement that ratification not occur until the President certified to the Senate that he had achieved the additional verification agreements. The argument was advanced that, under such circumstances, a second vote was not needed, and, if required, would make the first vote essentially meaningless. Moreover, some Senators asserted, such an unprecedented procedure was completely inconsistent with the President's October 10 commitment and represented a refusal by the Administration to act in good faith.

Although the President agreed to review the dual vote request, the Administration did not respond. Accordingly, at the Committee markup of February 19, Senator Pell proposed language for a resolution of approval which included a reservation as requested by the Administration with the single exception of deleting the phrase providing for a second vote. The reservation as modified stated:

> The advice and consent of the Senate to ratification of the Treaty on the Limitation of Underground Nuclear Weapons Tests is subject to the condition that the President shall not proceed with ratification of this treaty until he has certified to the Senate that the Union of Soviet Socialist Republics has concluded with the United States additional agreements expanding upon the obligations stated in Article II of the Treaty of Limitation of Underground Weapons Tests, including provisions for direct, accurate yield measurements taken at the site of all appropriate nuclear detonations, so that the limitations and obligations of these treaties, inter alia the 150-kiloton limit, are effectively verifiable.

The Committee unanimously, by voice vote, ordered the treaties reported with Senator Pell's suggested reservation on verification and with a declaration proposed by Senator Pell supporting the President's commitment to "immediate negotiations" on further testing restraints following TTBT and PNET notification.

The Reagan administration refused to support the compromise adopted by the Committee and the Senate did not consider the treaties in the remainder of the 100th Congress.

The Nuclear Testing Talks began in Geneva in November 1987, with the goal of achieving the new verification protocols. Before the Reagan Administration left office, agreement in principle had been worked out on the PNET portocol. The negotiating effort in the Bush Administration was centered on the TTBT protocol.

In September, 1989, the sides announced ad referendum agreement on the TTBT protocol. Remaining details were worked out over the next several months.

III. COMMITTEE ACTION

The Committee held hearings on July 17, 24, and 31, 1990. Witnesses at the first open hearing included the Honorable Ronald F. Lehman II, Director, United States Arms Control and Disarmament Agency (ACDA); the Honorable C. Paul Robinson, Chief Negotiator, Nuclear Testing Talks; Mr. Doug Graham, Deputy Assistant Secretary for Strategic Defense, Space and Verification Policy, Department of Defense; Lieutenant General George L. Butler, USAF, Director, Strategic Planning and Policy, Joint Chiefs of Staff; and, Dr. Victor E. Alessi, Director, Office of Arms Control, Department of Energy. Witnesses at the closed hearing on July 24, included representatives from the Intelligence Community. Witnesses at the hearing on July 31 included Dr. John H. Nuckolls, Director, Lawrence Livermore National Laboratory; Dr. Siegfried S. Hecker, Director, Los Alamos National Laboratory; Dr. Wolfgang K.H. Panofsky, Director and Professor Emeritus, Stanford Linear Accelerator Center; Dr. Gregory E. van der Vink, Director of Planning, the IRIS Consortium; and, Dr. Donald R. Westervelt, Physicist, Los Alamos National Laboratory. At a fourth hearing on September 13, the Committee heard from Senator David L. Boren and Senator William S. Cohen, the Chairman and Vice-Chairman, respectively, of the Senate Select Committee on Intelligence.

These hearings built upon testimony received during earlier hearings in 1987 on the two treaties. Witnesses included the Honorable H. Allen Holmes, Assistant Secretary of State for Politico-Military Affairs; the Honorable Robert B. Barker, Assistant to the Secretary of Defense (Atomic Energy): Lieutenant General Dale A. Vesser, USA, Director for Strategic Plans and Policy (J–5), Joint Chiefs of Staff; Admiral Sylvester R. Foley, Assistant Secretary for Defense Programs, Department of Energy; Dr. James H. McNally, Deputy Assistant Director, Bureau of Verification and Intelligence, Arms control and Disarmament Agency, representatives of the Intelligence Community, Dr. Roger Batzel, Director, Lawrence Livermore National Laboratories; Dr. Siegfried S. Hecker; the Honorable William Colby, Former Director, Central Intelligence Agency; Dr. Wolfgang K.H. Panofsky; Dr. Milo Nordyke, Leader, Treaty Verification Research Program, Lawrence Livermore National Laboratories, and Professor Paul G. Richards, Lamont-Doherty Geological Laboratory, Columbia University.

VERIFICATION OF THE TTBT AND PNET

There are four approaches to monitoring Soviet nuclear tests to determine if they are in compliance with the terms of the TTB and PNE Treaties. The four are (1) seismic monitoring, (2) hydrodynamic monitoring, (3) on-site inspections, and (4) National Technical Means. Each of the four will make a particular contribution to the overall fabric of verification. The Administration has ascribed particular importance to the achievement of agreement on hydrodynamic yield measurement and intends, according to Administration witnesses, to use hydrodynamic yield measurement at every available opportunity. It is important to understand the value of other monitoring methods, since hydrodynamic yield measurement would have decreased accuracy at lower yields, if agreed upon later, and no applicability to a complete ban.

Under the TTBT and PNET Protocols, each side would have the right to conduct hydrodynamic yield measurements at the site of all nuclear detonations of the other side which had a declared yield of over 50 kilotons. The United States would use CORRTEX (Continuous Reflectometry for Radius versus Time Experiments) technology for this purpose. When using CORRTEX at a Soviet test site, Soviet personnel would drill a satellite hole, parallel to the emplacement hole, to contain a special cable capable of carrying and returning electrical pulses. As a nuclear explosion takes place, the cable is crushed by the extreme pressures of the shock wave. The electrical pulses now reflect from the crushing point, shortening the time of reflection to the surface of the earth, thus measuring the point of initial crushing. As the crushed region expands, the time sequence of the radius of the shock front is determined. This data is used to estimate the yield of the weapon. Various equations and approaches have been developed by the Los Alamos National Laboratory for various geological media and geometries. For tests in the United States, the accuracy of the CORRTEX is validated by radiochemistry measurements of the radioactive debris of nuclear explosions.

Ambassador Robinson told the Committee that CORRTEX can determine the yield of nuclear explosions in the Soviet Union with an error of about 30 percent for 95 percent of the explosions in the region of 150 kilotons. Statistically, this means for the case of 100 explosions with yields of 150 kt, 95 of these explosions would be measured as having a yield between 115 kt and 195 kt. On average, 2.5 of the 100 explosions would have estimated yields above 195 kt and 2.5 would be estimated to be below 115 kt. In principle a nation would be wary of testing at 195 kt, because 97.5 percent of the events would register above 150 kt. The 95 percent confidence level implies a very high confidence in measurement, twice the usual standard deviation for errors. The Protocols specify that tests in nonstandard geometries would permit the verifying party to require further measurements: (1) The use of CORRTEX in more satellite holes, (2) the use of reference explosions, and (3) the use of seismic monitoring.

The TTBT will also be monitored by seismic methods. The nation carrying out the seismic monitoring of a nuclear explosion will be allowed the use of three seismic stations inside the testing country, as well as the already-existing seismic network outside the nation. At the time of the original treaty negotiations in 1974, the accuracy of seismology was thought to be within a factor of 2 (an error of 100 percent on the high side and 50 percent on the low side) for 95 percent of the events. Since that time, there has been considerable improvement in the methods and equipment for seismology: (1) The discovery of the unified-seismic method, using both body and surface waves, (2) the use of new seismic arrays, (3) the advent of in-country seismic stations in the Soviet Union, 3 from the TTBT regime and 12 from the IRIS Consortium, and (4) the possibility of using CORRTEX to calibrate nuclear test sites by measuring to determine the magnitude bias factor. Dr. Milo Nordyke, Director of the Center for Technical Studies of Security, Energy and Arms

Control at the Lawrence Livermore National Laboratory indicated in a September 1, 1990, statement for the hearing record:

> *Improvements in the Seismic Methodology.*—Prior to 1976, the primary emphasis within the explosion seismology community had been on the subject of detection and identification of nuclear explosions, key subject when considering a comprehensive test ban treaty, with only peripheral attention to the problem of yield estimation. Since 1976, however, major efforts within the seismic community have been directed at the problem of better understanding the relationship between yield and seismic magnitude in different geologies and accuracy and precision of seismic yields for Soviet weapons tests, particularly at the Shegan River test site.
>
> a. *Improvements in Precision.*—For many years the precision for seismic yields had been given as a factor of 2, generally based on teleseismic measurements of a particular seismic signal, the body wave which travels through the body of the earth. This factor reflected the uncertainties of determining a world-wide average seismic magnitude, the effectiveness of coupling for the geological environment believed to exist at Soviet test sites, as well as the size of the "magnitude bias factor."
>
> One of the most significant improvements has been the development of the "unified" seismic yield which is based on an average of two relatively independent seismic phases: the traditional body wave which travels down through the body of the earth, and the Lg wave which travels along the crust of the earth. A number of studies have shown that by averaging the yields obtained from these multiple waves that are generated by different mechanisms at the source, and that travel through the earth by different paths and as a different motions (i.e. with different transverse and radial components), a seismic yield can be obtained that has a random uncertainty due to variations within a test site in the range of 1.3–1.5. The overall uncertainty must, of course, include a contribution for the uncertainty in any systematic element—the "magnitude bias factor." Data from the JVE has, in large measure, addressed this element for the Shagan River Test Site.
>
> A further exciting development has been recent studies that show what, on the Eurasian Continent, the Lg wave may be able to give yields with a random uncertainty of less than 20 percent. Incorporation of this result into the "unified" yield methodology will reduce its overall uncertainty to significantly below 30 percent.
>
> b. *Improvements in Accuracy.*—The single largest source of uncertainty in the accuracy for seismic yields has been the uncertainty of the estimate of the "magnitude bias factor" for the Shagan River Test Site. The overall statistical uncertainty for this "magnitude bias factor" is about 40 percent. Because of the indirect nature of all past studies, there have questions regarding the exact size of the

> bias factor. The results from the JVE at the Soviet test site clearly confirmed the existence of a bias and indicated that the present value used by the seismic community is approximately correct.
>
> Statistical considerations indicate that as few as 4 explosions for which the yields have been measured by an onsite technique such as the hydrodynamic yield would determine the bias with an uncertainty of about 20 percent. This would lead to a reduction in the overall uncertainty for the seismic yield estimates, based on the unified seismic yield methodology and the new Lg data, to a factor of about 1.2–1.4, in the same range as that associated with CORRTEX on tests with standard geometries.

These conclusions are consistent with the findings of the 1988 Office of Technology Assessment report, "Seismic Verification of Nuclear Testing Treaties," which were presented to the Committee on October 6, 1988:

> Most seismologists feel that if new methods were applied, the resulting uncertainty for measuring explosive yields in the range of 150 kt at the Soviet test site would be closer to a factor of 1.5 than a factor of two. Present methods are stated to be accurate only to a factor of two in part because they have not yet incorporated the newer methods of yield estimation that use surface waves and Lg waves. The uncertainty of the comprehensive approach could be further reduced if calibration shots were performed and testing were restricted to areas of known geological composition. *It is estimated that through such measures, the uncertainty in seismically measuring Soviet tests could be reduced to a level comparable to the uncertainty in seismically measuring U.S. tests. An uncertainty factor of 1.3 is the current capability that seismic methods are able to achieve for estimating yields at the Nevada test site.* (Emphasis in the original OTA report.)

The two monitoring technologies, CORRTEX and seismology, can complement each other following ratification. As was shown by the Joint Verification Experiments, the use of CORRTEX will greatly reduce the systematic errors in the seismic measurements by reducing the error in the magnitude bias factor. Ultimately, this approach will make seismology and CORRTEX very competitive, but different, technologies. The hydrodynamic methods, CORRTEX and the Soviet technology MIZ, are not affected by the large scale geological properties of the test site and the earth below, but the hydrodynamic methods are much more sensitive than seismology to the geometry of the nuclear test and region within 20 meters of the test. Since these two complementary methods measure different aspects of nuclear explosions, their combined use will allow the technologies to cross-check each other. Because these are two independent measuring technologies, they will reduce the total error in the measurements and thus strengthen the total capability to determine violations of the 150 kiloton threshold. This synergistic relationship will be particularly helpful in the future, if the Soviets move their testing from Semipalatinsk to Novaya Zemlya due to environmental and other concerns.

When considering nuclear testing treaties at considerably lower levels, the utility of the CORRTEX technology is greatly diminished because of the very close proximity of the satellite hole to the emplacement hole. Because the Committee is interested in future nuclear testing treaties at lower levels, it is important that the Administration adequately fund research and development for the seismological monitoring technologies so that the Administration will be prepared to monitor future treaties that control nuclear tests at these lower yields. Two of the promising approaches are (1) the use of the Lg surface wave, and (2) the use of an in-country, remote, unattended seismic network.

SOVIET COMPLIANCE

In the course of the Committee's deliberations in 1987 and 1990, considerable attention was paid to the matter of Soviet compliance with the TTBT and PNET. The Administration had claimed previously, and reiterated at the 1987 hearings, that the Soviets have been in "likely" violation of the TTBT. Prior to 1990, the Presidential Reports to the Congress on Soviet Noncompliance with Arms Control Agreements have stated that "Soviet nuclear testing activities for a number of tests constitute a likely violation of legal obligations under the Threshold Test Ban Treaty." The most recent report, submitted on February 27, 1990, does not reiterate that charge, but states in the preamble that, "Past evidence suggested that the Soviet Union also violated the TTBT."

However, advances in seismic techniques, exchanges of data on previous tests, and information from Joint Verification Experiments have, taken together, led to increasing doubt as to the validity of any charge of Soviet cheating.

In 1988, the parties to the treaties exchanged data on five earlier tests each and visited each other's test sites for one Joint Verification Experiment each. This data is being used by government scientists to examine the data on past Soviet explosions. Until recently, the Administration refused to provide the data and the results of the Joint Verification Experiments to the Congress. That material has now been provided pursuant to a request by Senator Pell, although in classified form.

In regard to the JVE data, Dr. Nordyke, Director of the Center for Technical Studies of Security, Energy and Arms Control at the Lawrence Livermore National Laboratory, said in his September 1, 1990 statements to the Committee:

> The Soviet JVE [Joint Verification Experiment] also provided an opportunity to evaluate the accuracy of the seismic yield methodology on the assumption that the average of the hydrodynamic yield measurements was the true yield. The U.S.G.S. National Earthquake Information Service (NEIS) measured a seismic magnitude of 6.1 for the Soviet JVE. If that explosion had been fired at NTS, such a magnitude would have corresponded to a yield of at least 350 kt. The U.S has chosen to keep these data classified so I cannot give you the yield measured by the hydrodynamic

> measurement. But suffice it to say, if there were no bias correction as some people have claimed in the past and the CORRTEX yield estimate was, in fact 350 kt or larger, I am sure these treaties would not be before the Senate for advice and consent.

The Committee has heard considerable testimony on the compliance issue, such as:

(1) The directors of both the Los Alamos and Lawrence-Livermore National Laboratories have both testified twice, in 1987 and in 1990, that they disagree with the finding of a "likely violation." On July 31, in response to a question by Senator Pell:

> Do you believe basically that the Soviets have complied with the TTBT over the past period of years?

Both Dr. John H. Nuckolls, Director of the Lawrence-Livermore National Laboratory, and Siegfried S. Hecker, Director of the Los Alamos National Laboratory, testified affirmatively.

(2) On September 13, 1990, Senator Boren testified that the Senate Select Committee on Intelligence

> went on to look at past Soviet compliance with the 150-kiloton limits which both we and they had promised to observe since 1976. Given current U.S. Government estimates of yields of past nuclear tests, we can rule out any major Soviet violation since 1976. The pattern of past Soviet testing is consistent with either of two other hypotheses: Soviet compliance with the 150 kiloton-limit; or a few slight violations of it. I would say very slight violations might have been possible, but I stress, given the improvements of our own seismic techniques and our own capabilities of looking at the data, that it is very possible that there have been no violations at all.

Although the possibility exists that a few Soviet tests in the past 14 years may have exceeded the limit, it is important to remember that the parties agreed that "one or two slight, unintended breaches a year," while cause for concern and discussion, would not be considered violations. Significantly, President Bush made clear in his letter of transmittal his intent that such infrequent, slight and unintended breaches should not be considered violations.

REPORT OF THE CHAIRMAN AND VICE CHAIRMAN OF THE SENATE SELECT COMMITTEE ON INTELLIGENCE

At the request of Senator Pell, the Select Committee on Intelligence provided the Committee and the Senate a report on the ability of the United States to monitor compliance by the Soviet Union with the Treaties. The report was adopted by the Select Committee by a unanimous vote on September 12. On September 13, the Chairman of the Select Committee, Senator David L. Boren, and the Vice-Chairman, Senator William S. Cohen, presented unclassified testimony on their report, "U.S. Capability to Monitor Soviet Compliance with the Threshold Test Ban Treaty (TTBT) and the Treaty on Peaceful Nuclear Explosions (PNET)," to the Committee. The Committee issued its unclassified and classified reports on September 14. The classified report is available to members through the Select Committee.

The Committee's unclassified report is being published as Senate Report 101–462. The complete unclassified testimony of Senator Boren and Cohen is included in the printed hearings of the Committee on Foreign Relations on the TTB and PNE Treaties. The Intelligence Committee's report is printed in the Appendix of this report.

At the September 13 hearing of the Foreign Relations Committee, Senator Boren emphasized particular findings from the Select Committee Report: "First of all, U.S. capabilities have been significantly improved in recent years, thanks to both improved methodologies and the new verification protocols. The Committee concludes that U.S. capabilities will be sufficient to monitor Soviet compliance with the 150-kiloton limits. The Soviets could conduct tests slightly above the 150-kiloton limits in the TTBT and PNET without the U.S. government being absolutely certain that they had done so. The Soviets could not evade the 150-kiloton limits by a significant amount, however, without a lengthy, costly, and risky covert evasion effort. I might say that our witnesses, including Chairman of the Joint Chiefs, General Powell, indicated that they thought the risks of evasion, particularly in any form that would be military significant, were within the de minimus range to the degree that he would recommend ratification of these agreements."

Senator Boren further stated that "It will be more difficult to monitor Soviet compliance with 35 kiloton and 50 kiloton trigger levels for on-site inspection and hydrodynamic or in-country seismic monitoring. But, even a 100 percent violation of these trigger levels would still leave the Soviets well below the 150-kiloton limit. The trigger levels will effectively serve their primary purpose, therefore, of making any major evasion of the 150 kiloton limits a much more daunting task for the Soviets." Senator Boren said that the Select Committee had examined the possible motivations, and the associated risks of cheating that the Soviets would have if they were to violate the Treaties. He concluded that:

> The cost, risk and uncertainty factors would all increase if more than one illegal test were attempted. In light of these motivations and risks, none of the executive branch experts expected the Soviet Union to attempt any evasion of the Treaties, but the experts still presented evasion scenarios to us as we had requested. These scenarios included an unannounced explosion in a large cave to reduce the seismic signal generated by the explosion, multiple-explosion tests that would degrade seismic estimates of yield, and testing in deep space, which would be a violation primarily of the Limited Test Ban Treaty of 1963. These were all taken into account in reaching the findings which I have described to you, the essential finding being that we feel we have sufficient capability to verify these Treaties and Protocols for them to be in the National interest for us to enter into them.

On the matter of further negotiations with the Soviets on further restrictions on nuclear testing, Senator Boren stated:

> Finally, let me note that paragraph 3 of Article I of the TTBT is likely to result in negotiations with a view toward achieving a solution to the problem of cessation of all underground nuclear tests . . . . Our Committee did not consider whether the United States should negotiate further constraints in nuclear testing, but we do support further research into technologies that may contribute to verification of compliance with any new obligations the United States might undertake. We are not talking about any tremendous expense here, but we are talking about making the necessary investment so that we would be as ready as possible for whatever agreement the policymakers might some day decide to make. If they should go to a total ban, we would be in a position at that point to have more appropriate, better verification techniques.

Senator Cohen discussed issues pertaining to counterintelligence matters and the amendment process for the Protocols. On the issue of counterintelligence, Senator Cohen stated that:

> Overall, the Committee's review found that the Executive Branch had made sensible and sound decisions on policy and organization for implementing the verification Protocols, analyzing the resulting data, producing monitoring estimates, and reaching verification judgments. We remain concerned, however, about the threat of Soviet intelligence exploitation of the inspection process, and this includes the targeting of U.S. inspectors in the Soviet Union, seeking to compromise the secrecy of U.S. nuclear weapons, and attempting to gain information on sensitive defense programs. Unfortunately, we have discovered that no comprehensive interagency risk assessment has yet been completed. . . . As a consequence, the Committee recommends that a condition to the instrument of ratification be enacted requiring that the President not exchange instruments of ratification until he certifies to the Senate that sufficient resources and time are available to prepare the TTBT implementation, including counterintelligence and security measures.

In response to this recommendation by the Select Committee, General Brent Scowcroft, Special Assistant to the President for National Security responded with the following letter to Senators Boren and Cohen:

THE WHITE HOUSE
WASHINGTON

September 13, 1990

Dave

Dear Mr. Chairman:

As the Threshold Test Ban Treaty and the Treaty on Peaceful Nuclear Explosions proceed toward the Senate's advice and consent on ratification, I want you to know that we share the Senate Intelligence Committee's concern over the need to implement effective counterintelligence and security measures to protect U.S. personnel and programs from improper collection of information by Soviet on-site inspectors or monitors. This is a matter of high priority for the Administration.

There are several elements to these measures, all of which need to be in place before Soviet inspectors and monitors may safely be hosted. These include the selection of suitable locations for housing Soviet personnel for the Nevada Test Site and the Designated Seismic Stations. (It might prove necessary to select a temporary site, with the understanding that a permanent site will be completed promptly.)

Once these decisions are made, we can finalize the necessary security details to protect personnel or programs that might otherwise be vulnerable to compromise and also resolve any remaining funding matters. While these matters must be addressed expeditiously, we do not want to rush into decisions that could later prove harmful to the national security.

I want to assure you that the Administration will take no action under the Treaty that would endanger or compromise vulnerable U.S. programs.

I appreciate your concerned approach to these questions and look forward to our continued cooperative efforts to ensure that the interests of arms control verification and security are satisfied.

Sincerely,

Brent
Brent Scowcroft

The Honorable David L. Boren
Chairman
Select Committee on Intelligence
United States Senate
Washington, D. C. 20510

In addition, Senators Boren and Cohen indicated that they shared the concerns of some Members of the Committee on Foreign Relations regarding the importance of arrangements under which the Committees could voice objections to changes to the TTBT Protocols before issues became moot. The Intelligence Committee was particularly concerned with regard to changes that might have an impact on monitoring, counterintelligence or security capabilities.

The Committee assessed the Scowcroft assurance regarding Administration preparation to cope with the presence of Soviet inspectors and monitors and the Administration's intent to take any actions which could endanger or compromise United States programs. Administration representatives, Members and staff reviewed the issue of advance notification at length the day of Committee markup. The result was a clarifying letter from Ambassador Lehman which committed the Administration to providing prior notice of changes to the Protocols. On the basis of the assurances from these two officials, the Committee believes these problems have been adequately addressed.

EXECUTIVE BRANCH ASSURANCES

During the course of the Committee's consideration of the TTBT and its Protocol, concerns were expressed with respect to the manner in which Section XI of that Protocol would be implemented. That Section provides for the establishment of a Bilateral Consultative Commission to consider, *inter alia,* ". . . any technical or administrative changes" to the Protocol, as well as any "modifications to verification procedures . . . [that] would enhance effective implementation of the basic aims of the Treaty or this Protocol. . . ."

Members were concerned that some of the changes or modifications contemplated by the Section XI provisions in the Protocol might be of a sufficiently substantive nature as to constitute amendments to the Treaty, and thus be subject to advice and consent of the Senate under the U.S. Constitution. Accordingly, on July 31, 1990, the Chairman wrote to the Director of the Arms Control and Disarmament Agency seeking clarification on this issue:

> . . . it is necessary to have the Administration's written clarification of the areas of permissible modification contemplated. . . . This would ensure that changes to the Treaty and Protocol requiring Senate advice and consent would be treated according to constitutional requirements.

On September 11, 1990, the Director provided the Committee with the following written assurance:

> . . . [W]ith respect to the modifications contemplated . . . I can confirm that the intention of these paragraphs is to enable the Parties, on the basis of their day-to-day experience in living with the Protocol, to make such changes of a technical, administrative or procedural nature as do not affect substantive rights and obligations under the Treaty and Protocol, that will improve the effectiveness of the verification regime. Any change of a substantive nature that would have an effect upon basic aims of the Treaty or

> rights and obligations of the Parties would have to be made by means of an amendment.

The Committee has concluded that the foregoing assurances adequately safeguard the Senate's constitutional responsibilities in the treaty-making process and that the procedures outlined in Section IX of the Protocol will not be implemented in a manner inconsistent with those responsibilities. Moreover, additional assurances have been received which, the Committee believes, will facilitate the review of all proposed Section XI changes or modifications in a manner that reinforces those Senate responsibilities. The Chairman had informed the Executive Branch that the Committee would allow modifications "only on a case-by-case basis" and "would expect the Administration to inform it of any proposed modification . . . . (to) enable the Committee to voice an objection in appropriate cases, before the issue becomes moot." Ambassador Lehman assured the Committee, in writing, that the Executive Branch will engage in "continuing consultations with the Senate" and that it will provide—

> notice concerning any modifications and changes to the provisions of the TTBT Protocol negotiated with the Soviets prior to such modifications and changes becoming binding on the Parties. The objective of this further assurance is to provide notice before an issue becomes moot.

Based upon such assurances, the Committee is satisfied no changes or modifications pursuant to Section XI of the TTBT Protocol that require Senate advice and consent will become binding on the Parties unless and until the Senate has exercised its constitutional responsibilities.

Committee satisfaction with the foregoing assurances is buttresssed by Executive Branch affirmations regarding the authoritativeness of Executive Branch testimony and interpretation of the provisions of the Treaties and Protocols. The Committee Chairman requested in a July 31 letter that the ACDA Director address this issue:

> . . . I would appreciate your affirming that your testimony in explanation of the meaning of the Treaties and the obligations they entail, along with that of other Executive branch witnesses and materials submitted for the record, can be regarded as authoritative, and that the Senate can expect the Executive branch to regard itself as bound to interpret and implement the Treaties in accord with these representations without the need for the Senate to incorporatate such interpretations in its resolution of ratification.
>
> This affirmation would necessitate that the Administration identify any instance in which an Executive branch witness's testimony is not authoritative and any discrepancies that may exist between the testimony given by its representatives and the testimony of representatives of previous administrations concerning the obligations of the United States under the two treaties.

On September 11, 1990, the ACDA Director provided the following written reply:

> . . . [W]ith respect to the testimony of Administration witnesses received by your Committee during consideration of these two Treaties, I can affirm that the Senate should regard explanations of the meaning of the Treaties and the obligations they entail as authoritative, and that the Senate can expect the Administration to interpret and implement the Treaties in accord with such explanations. With respect to testimony on these Treaties given by previous Administrations, we are unaware of any substantive differences that we would have with such testimony as it relates to interpretation of the Treaties, and we will be happy to comment on any specific statements that you may have in mind.

SAFEGUARDS

A further matter addressed was a list of safeguards originally proposed by the Joint Chiefs of Staff in 1987. At that time, staff level discussions led to development of slightly modified texts. Renewed discussion between Committee staff and JCS and Administration staff resulted in further modification to achieve safeguards which could merit broad, bipartisan support. The Administration informed the Committee prior to markup of its support for the safeguards as modified in the most recent discussions.

Testifying on behalf of the Joint Chiefs of Staff, Lieutenant General George L. Butler, USAF, told the Committee:

> So long as nuclear weapons remain an essential element of our overall deterent strategy, there should be safeguards to hedge against unexpected political or technical events, affecting the military balance.

The Committee can appreciate the concerns of the Joint Chiefs with regard to safeguards. It is important to be prepared to cope with developments which may affect the military balance. It is also important to understand that unexpected political or technical events can have positive, as well as negative, effects. Accordingly, safeguards must be seen as guidelines to maintain the proper balance of nuclear testing programs, legitimate national security interests, and budgetary priorities.

The Committee believes that the standards of the safeguards are being essentially met now so far as is practicable and that no major new programs or spending would be required on the basis of establishment of the safeguards.

With the important qualifications understood, the Committee concludes that the modified safeguards would constitute a valuable guide in making program and budget decisions. The modified safeguards are as follows:

Safeguard "A"

The conduct, within the constraints of treaties on nuclear testing, of effective and continuing underground nuclear test programs designed to add to our knowledge and improve our weapons in all areas of significance to our military posture for the future.

Safeguard "B"

The maintenance of modern nuclear laboratory facilities and programs in theoretical and exploratory nuclear technology which will attract, retain, and ensure the continued application of our human scientific resources to those programs on which continued progress in nuclear technology depends.

Safeguard "C"

The maintenance of the basic capability to resume nuclear test activities prohibited by treaties should the United States cease to be bound to adhere to such treaties.

Safeguard "D"

In conjunction with an effective verification program, the conduct of comprehensive and continuing research and development programs to improve our treaty monitoring capabilities and operations.

Safeguard "E"

The continuing development of a broad range of intelligence gathering and analytical capabilities and operations to ensure accurate and comprehensive information on worldwide nuclear arsenals, nuclear weapons development programs, and related nuclear programs.

MARKUP

At its markup on September 14, in separate votes, the Committee ordered reported favorably the Threshold Test Ban Treaty and the new Protocol thereto subject to two declarations and the Peaceful Nuclear Explosions Treaty and the new Protocol thereto. Voting in the affirmative on each motion were Senators Pell, Biden, Sarbanes, Cranston, Dodd, Kerry, Simon, Sanford, Moynihan, Robb, Helms, Lugar, Kassebaum, Boschwitz, Pressler, Murkowski, McConnell, Humphrey, and Mack.

IV. Committee Comments

The Committee welcomes the effort made by the Administration to complete the verification protocols to the TTBT and PNET so that the two treaties can be ratified with strong bipartisan support.

Clearly, the new verification protocols will help in resolving residual compliance questions and increase incentives for, and confidence in, future compliance.

The United States, the Soviet Union and Great Britain have a long-standing commitment in the Limited Test Ban Treaty and in the Non-Proliferation Treaty of 1968 to seek to achieve the discontinuance of all test explosions of nuclear weapons for all time and to continue negotiations to this end. The United States and the Soviet Union have renewed that commitment in the Threshold Test Ban Treaty. Moreover, for the first time, the parties have undertaken a legally binding commitment to "continue their negotiations with a view toward achieving a solution to the problem of the cessation of all underground nuclear weapon tests."

It is clear that Ambassador Robinson and his team conducted the Nuclear Testing Talks in Geneva with a sensitivity to our legitimate security interests and a commitment to success. The Committee believes that there is reason to conclude that continuation of these talks could be quite productive.

In a letter to Senator Pell of July, 1990, the President's National Security Advisor, Brent Scowcroft wrote,

> As we put into practice the new verification protocols, the United States will be ready to propose negotiations on possible further limitations that make sense from a national security standpoint, contribute to stability, and still guarantee a reliable, safe, and effective deterrent.

Accordingly, in support of that expressed goal, the Committee believes that both sides should make every effort to achieve further limitations on nuclear testing, including the achievement of a verifiable comprehensive test ban.

The United States and Soviet Union are now engaged in a strong effort to place meaningful controls on the quantitative arms race. A serious and successful parallel effort to put strong qualitative controls in place should include a commitment to resolve the nuclear testing issue.

V. SECTION-BY-SECTION ANALYSIS

Each article of the Threshold Test Ban Treaty, each paragraph of the Protocol to the Treaty, and each article of the Peaceful Nuclear Explosions Treaty and the Protocol thereto is described below. The analysis is based upon the text of the article or paragraph, the negotiating history, and relevant commentary. Subject to the provisions of any additional agreements on verification the President may reach with the leader of the Union of Soviet Socialist Republics, the legal obligations the United States would incur by ratifying the TTBT and PNET are set out in this section:

THRESHOLD TEST BAN TREATY

Preamble

The preamble consists of four paragraphs which set forth the common premises and objectives of the Parties.

The first preambular paragraph expresses the intention of the Parties to achieve the cessation of the nuclear arms race at the earliest possible date and to take effective measures toward reductions in strategic arms, nuclear disarmament, and general and complete disarmament under strict and effective international control.

The second preambular paragraph recalls the objectives of the Limited Test Ban Treaty to seek to achieve the discontinuance of all underground nuclear weapon tests and to continue negotiations to this end, while the third preambular paragraph notes that the adoption of measures for the further limitation of such tests would contribute to the achievement of these objectives and also to the strengthening of peace and the further relaxation of international tension.

The fourth and final preambular paragraph reaffirms the Parties' adherence to the objectives and the principles of the Limited Test Ban Treaty and the Treaty on the Non-Proliferation of Nuclear Weapons (the Non-Proliferation Treaty).

Article I

Article I of the TTB Treaty consists of three paragraphs. The first paragraph contains an undertaking by each Party to prohibit, to prevent, and not to carry out any underground nuclear weapon tests having a yield exceeding 150 kilotons at any place under its jurisdiction or control, beginning March 31, 1976.

The interrelationship between the TTB Treaty and the PNE Treaty, and in particular, the imposition of identical yield limitations for individual explosions is of considerable significance. During the negotiations of the PNE Treaty, the Parties investigated whether individual underground nuclear explosions for peaceful purposes with yields above 150 kilotons could be accommodated consistent with the agreed aim of not providing weapon-related benefits otherwise precluded by the TTB Treaty. The Parties did not develop a basis for such an accommodation, largely because it has not been possible to distinguish between nuclear explosive device technology as applied for weapon-related purposes and as applied for peaceful purposes. The Parties therefore agreed that the yield limitations on individual explosions in the two Treaties would be the same.

The technical problems associated with a yield threshold were recognized by the sides in the Spring of 1974 during the negotiation of the TTB Treaty. In this context the U.S.S.R. mentioned the idea of some kind of a "mistakes" understanding concerning occasional, minor, unintended breaches. Discussions on the subject of such an understanding took place in the Autumn of 1974 and in the Spring of 1976. The U.S.S.R. was informed by the United States that the understanding reached would be included as part of the public record associated with submitting the TTB Treaty to the Senate for advice and consent to ratification. The entire understanding is as follows:

Both Parties will make every effort to comply fully with all the provisions of the TTB Treaty. However, there are technical uncertainties associated with predicting the precise yield of nuclear weapon tests. These uncertainties may result in slight, unintended breaches of the 150 kiloton threshold. Therefore, the two sides have discussed this problem and agreed that: (1) One or two slight, unintended breaches per year would not be considered a violation of the Treaty; (2) such breaches would be a cause for concern, however, and, at the request of either Party, would be the subject of consultations.

The U.S.S.R. was also informed that while the United States would not consider such a slight, unintentional breach a violation, the United States would carefully review each such breach to insure that it is not part of a general attempt to exceed the confines of the Treaty.

The second paragraph of Article I contains an obligation for each Party to limit the number of its underground nuclear weapon tests to a minimum.

The third paragraph obligates the Parties to continue negotiations aimed at solving the problem of the cessation of all underground nuclear weapon tests. Discussions have been continuing on this subject at the Conference of the Committee on Disarmament in Geneva.

Article II

Article II consists of three paragraphs relating to verification of compliance with the provisions of the TTB Treaty by national technical means. The first two paragraphs are identical to paragraphs 1 and 2 of Article XII of the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems (the ABM Treaty) and paragraphs 1 and 2 of Article V of the Interim Agreement between the United States of America and the Union of Soviet Socialist Republics on Certain Measures with Respect to the Limitation of Strategic Offensive Arms (the Interim Agreement).

Paragraph 1 states that each Party will use national technical means of verification in a manner consistent with generally recognized principles of international law, and paragraph 2 obligates each Party not to interfere with the national technical means of verification of the other Party operating in accordance with paragraph 1.

Paragraph 3 provides that, in order to promote the objectives and implementation of the Treaty, the Parties shall, as necessary, consult with each other, make inquiries and furnish information in response to such inquiries.

Article III

Article III specifically provides that this Treaty does not apply to underground nuclear explosions for peaceful purposes and provides that the Parties will negotiate an agreement governing such explosions at the earliest possible time. The PNE Treaty, submitted together with this Treaty, is the product of the negotiations conducted pursuant to this Article.

Article IV

Article IV provides that the Treaty is to be ratified in accordance with the constitutional procedures of each Party and is to enter into force on the day of the exchange of instruments of ratification. Because of the interrelationship of the two Treaties, the Parties agreed, in Article IX of the PNE Treaty, that there should be a simultaneous exchange of instruments of ratification of both Treaties.

Article V

Article V consists of three paragraphs. The first paragraph provides that the Treaty shall remain in force for a period of five years unless replaced earlier by an agreement in implementation of paragraph 3 of Article I, which required the Parties to "continue their negotiations with a view toward achieving a solution to the problem of the cessation of all underground nuclear weapon tests." The Treaty shall be extended for successive five-year periods unless either Party notifies the other of its termination no later than six months prior to the expiration of the Treaty.

The second paragraph of Article V permits each Party to withdraw from the TTB Treaty upon six months notice, if such Party decides that its supreme interests have been jeopardized by extraordinary events related to the subject matter of the Treaty. This type of withdrawal clause first appeared in the Limited Test Ban Treaty and has been included in a similar form in most subsequent arms control agreements.

The third paragraph provides that the TTB Treaty wil be registered pursuant to the United Nations Charter.

June 22, 1990

SECTION BY SECTION ANALYSIS OF THE PROTOCOL TO THE TREATY ON THE LIMITATION OF UNDERGROUND NUCLEAR WEAPON TESTS

The Protocol consists of a preamble and thirteen sections, organized as follows:

Section I.	Definitions
Section II.	Test Sites
Section III.	Verification Measures
Section IV.	Notifications and Information Relating to Tests
Section V.	Hydrodynamic Yield Measurement Method
Section VI.	Seismic Yield Measurement Method
Section VII.	On-Site Inspection
Section VIII.	Equipment
Section IX.	Designated Personnel and Transport Personnel
Section X.	Entry, Transport, Food, Lodging, and Provision of Services for Designated Personnel and Transport Personnel
Section XI.	Procedures for Consultation and Coordination
Section XII.	Release of Information
Section XIII.	Entry Into Force

PREAMBLE

In the Preamble the Parties confirm the provisions of the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests (TTBT) and state their conviction that it is necessary to ensure effective verification of compliance with that Treaty.

SECTION I.

In Section I, the definitions of significant terms used throughout the Protocol are set out in roughly the order in which they appear in the Protocol. Deviations from that order are intended to place related terms in proximity to each other.

It should be noted that important concepts that guide the verification approach taken in the Protocol are to be found in the definitions.

1. A "test site" is defined as the specified location at which underground nuclear weapon tests are conducted by each Party. In Section II, these test sites are precisely identified and the procedures for delineating new test sites are precisely

described. The definition of test sites and the requirements of Section II establish that all nuclear weapon tests must be conducted at test sites.

2. The term "test" is used to describe an underground nuclear explosion at a test site or two or more underground nuclear explosions at a test site taking place within one-tenth second, and separated by no more than two kilometers. The verification rights set forth in the Protocol are tied to a "test," and flow from its planned yield. If a test is made up of more than one explosion, the planned yield attributed to the test is the aggregate of the planned yields of the individual explosions within the test.

3. An "explosion" is defined as the release of nuclear energy from an explosive canister. Thus, regardless of the number of explosives within an explosive canister, there will be only one "explosion" for the purposes of the Protocol for each explosive canister.

4. An "explosive canister" is defined so as to establish that for every "explosion" there is an explosive canister. Whether the "canister" is a container, or just the outermost covering of the explosive or explosives, there will always be a canister external to an explosive or group of explosives.

5-6. The terms "Testing Party" and "Verifying Party" are defined so as to make the terms applicable prior to the actual undertaking of any activities; thus the Party planning to carry out a test is the "Testing Party," and the Party entitled to verify that test is, from the moment it is notified of the test, the "Verifying Party."

7. The term "Designated Personnel" is used to mean all the individuals who actually are engaged in carrying out verification activities in the territory of the Testing Party in accordance with the Protocol. Designated Personnel, for any test, are nationals of the Verifying Party, drawn from a list of individuals accepted by the Testing Party.

8. The term "Transport Personnel" is used to describe those individuals, drawn from a list accepted by the Testing Party, who are nationals of the Verifying Party and who provide transportation to and from the point of entry, for Designated Personnel, their baggage, and equipment of the Verifying Party.

9. The term "point of entry" is used to describe the place, in the territory of the Testing Party, at which Transport Personnel, Designated Personnel and equipment of the Verifying Party enter and exit the territory of the Testing Party. The points of entry are specified in the definition: Washington,

D.C., and Travis Air Force Base for the U.S., and Moscow and Leningrad for the U.S.S.R. Designated Personnel and Transport Personnel may enter at either point of entry of the Testing Party. Equipment, however, may enter the territory of the Testing Party only through Travis Air Force Base, in the case of the U.S., and Moscow, in the case of the U.S.S.R. The airports associated with U.S. points of entry are limited to Travis Air Force Base and Dulles International Airport near Washington, D.C., and Sheremetyevo-2 for Moscow and Pulkovo-2 for Leningrad.

10. The term "hydrodynamic yield measurement method" is used to describe the method of measuring the yield of an explosion by measuring the properties of the shock wave produced by an explosion as a function of time, using sensors and, in some cases, transducers emplaced by the Verifying Party in one or more satellite holes adjacent to the hole or holes in which an explosion or explosions are conducted by the Testing Party. The procedures relating to activities of Designated Personnel carrying out hydrodynamic yield measurements are set forth in Section V of the Protocol.

11. The term "seismic yield measurement method" is used to describe the method of deriving the yield of one or more explosions constituting a test by means of measuring the motion

of the earth produced by the test at distances of hundreds of miles. The procedures relating to activities of Designated Personnel carrying out seismic measurements are set forth in Section VI of the Protocol.

12. The term "on-site inspection" is used to describe activities of Designated Personnel, at the site of the test, designed to obtain information about the physical and geological conditions under which the test will be conducted and to validate information provided by the Testing Party. The procedures relating to activities of Designated Personnel carrying out on-site inspection are set forth in Section VII of the Protocol.

13. The term "emplacement hole" describes each hole (including tunnels, adits and shafts) in which the Testing Party emplaces one or more explosive canisters and its own associated equipment related to a test.

14. The term "end of the emplacement hole" does not necessarily mean the physical end of the hole, but is used to describe a reference point established by the Testing Party along the axis of the emplacement hole, prior to the emplacement of an explosive canister, for each explosive canister.

15. The term "satellite hole" means each of the holes (including drill-holes, tunnels, adits and shafts) in which the Verifying Party installs its equipment, described in definitions 23 and 24, for using the hydrodynamic yield measurement method.

16-17. For purposes of the use of the hydrodynamic yield measurement method, the term "standard configuration" is used to describe a test configured in conformity with parameters set forth in Section V of the Protocol for either tests that utilize a vertical emplacement hole (or holes) or a horizontal emplacement hole (or holes). The Protocol does not require that a test be conducted in a particular configuration; rather the Protocol describes certain characteristics of a test configuration, in terms of, for example, dimensions of each emplacement hole, dimensions of explosive canisters, and parameters for emplacement of explosives and diagnostics, and then provides that if a test configuration has these characteristics it will be considered "standard." If a test does not have these configuration characteristics its configuration is considered "non-standard."

18. The term "hydrodynamic measurement zone" is used to describe a region of prescribed dimensions surrounding an explosive canister within which hydrodynamic yield measurements may be carried out.

19. The term "reference test" is used to describe a particular test of standard configuration with respect to which the Verifying Party may use the hydrodynamic yield measurement method for the purpose of establishing a basis of comparison for teleseismic measurements of that test and an associated test of non-standard configuration.

20. The term "emplacement point" is used to describe that point in an emplacement hole at which the center point of an explosive canister is located.

21. The term "choke section" is used to describe a barrier designed to limit and delay the flow of energy from an explosive canister.

22. The term "area of a pipe" or "area of a cableway" is defined as the area of the external cross section of a pipe or a cableway at the point at which the pipe or cableway, within a specified region, is largest.

23. The term "sensing elements and cables" is used to describe the sensors, including switches, used by the Verifying Party as an integral element of equipment used for the hydrodynamic yield measurement method and installed in a satellite hole to determine the arrival time of the shock wave. Transducers,

which otherwise might be considered sensing elements, are excluded from the term as it is used in the Protocol, and are defined separately.

24. The term "transducers" is used to describe particular devices installed by Designated Personnel in a satellite hole, to measure properties of a shock wave other than its arrival time in certain prescribed situations.

25. The term "core sample" is used to describe an intact cylindrical sample of geologic material, such as rock, with prescribed minimum dimensions. If a given sample is not intact and of at least the prescribed dimensions, it is not a "core sample" for purposes of the Protocol.

26. The term "rock fragment" is used to describe an irregularly shaped piece of rock of at least 10 cubic centimeters in volume. If a given fragment is less than 10 cubic centimeters in volume it is not a "rock fragment" for the purposes of the Protocol.

27. The term "geodetic measurements" is used to describe the means of determining the locations of points in tunnels or cavities by surveying techniques.

28. The term "Designated Seismic Station" means any one of the three named stations in the United State and of the three named stations in the U.S.S.R at which Designated Personnel may be present during a test to carry out seismic measurement activities provided for in Section VI of the Protocol.

29. The term "Bilateral Consultative Commission" (BCC) is the name of the Commission established by the Protocol in which the Parties may address certain matters relating to the Protocol.

30. The term "Coordinating Group" is the name given to the subordinate body of the Bilateral Consultative Commission that is established for each test.

31. The term "coordinated schedule" refers to the schedule that will be established in the Coordinating Group with respect to a particular test. This schedule will specify the precise times and durations of each verification activity.

32. The term "Nuclear Risk Reduction Centers" means the centers, established by the agreement between the U.S. and the U.S.S.R. on the establishment of Nuclear Risk Reduction Centers of September 15, 1987, that will be used for transmitting notifications and other information between the Parties as provided for in the Protocol.

SECTION II.

In this Section the test sites of each Party are specified. This removes any uncertainty as to where nuclear weapon tests may be conducted following entry into force of the Treaty.

Paragraph 1 requires that simultaneous with entry into force, i.e., upon the exchange of instruments of ratification, each Party must provide the other with a written description of the boundaries, and a diagram to a prescribed scale, of its test sites. In the case of the United States only one test site is named; in the case of the U.S.S.R., two test sites are named.

Paragraph 2 permits a Party to change its test sites, either by revising the boundaries of an existing test site or by establishing a new site or sites. However, a Party may not conduct a test at a new site or in a newly added area of an existing site unless at least 12 months before the test it has provided the other Party with the same information relating to boundaries, and the same kind of diagram, that each Party must provide upon entry into force of the Treaty with respect to existing test sites. It is thus clear that establishment of a new or expanded test site does not require amendment of the Protocol.

Paragraph 3 establishes that all nuclear weapon tests must be conducted at test sites specified in paragraph 1 or in accordance with procedures set forth in paragraph 2, and that a Party may not establish a test site outside its territory.

Paragraph 4 establishes that all underground nuclear explosions at a test site are deemed nuclear weapon tests. Thus, any explosion at a test site is covered by the TTBT, including its Protocol, while all explosions elsewhere are covered by the Treaty Between the United States of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes (PNET), including its Protocol. The question of how many tests may be involved if explosions are detonated in proximity and within a given period of time is determined in accordance with the definition of "test" in Section I.

SECTION III.

This Section sets forth the basic verification rights of each Party with respect to tests having specified minimum planned yields. The verification rights include use of the hydrodynamic yield measurement method, use of the seismic yield measurement method and on-site inspection. In order to provide each Party an opportunity to be fully informed with respect to a planned test and fully prepared prior to commencing verification activities, the first test of the Testing Party that would be subject to the verification measures of the Protocol will be the first test it conducts 200 days following entry into force of the Treaty. The period of 200 days is chosen because that is the minimum period of advance notice of a test that a Party planning a test (the Testing Party) must provide the other Party (the Verifying Party.)

Paragraph 1 establishes that the particular verification rights of the Verifying Party depend on the planned yield of the test. If a test is made up of more than one explosion, the verification rights attach to each explosion within a test, based on the aggregate yield of the test. If the planned yield of the test exceeds 35 kilotons but does not exceed 50 kilotons, the Verifying Party has the right to on-site inspection (specified in Section VII). If the planned yield of a test exceeds 50 kilotons, the Verifying Party has the right to use the hydrodynamic yield measurement method (specified in Section V), the seismic method (specified in Section VI), or both. If, with respect to a test having a planned yield exceeding 50 kilotons, the Verifying Party elects not to use the hydrodynamic yield measurement method, the Verifying Party may carry out on-site inspection, seismic yield measurements, or both. In the exercise of its verification rights, the Verifying Party may carry out fewer than all the activities that it has a right to carry out.

In addition to the rights provided in paragraph 1, paragraph 2 establishes the right of the Verifying Party to use the hydrodynamic yield measurement method for at least two tests in each of the first five calendar years following entry into force of the Protocol. Thus, paragraph 2(a) provides that in any of those five years, if a Party conducts at least two tests but does not conduct at least two tests having a planned yield exceeding 50 kilotons, the other Party shall have the right to use the hydrodynamic yield measurement method with respect to two tests, as if they each had a planned yield exceeding 50 kilotons. The two tests would be selected by the Testing Party from among those having the highest planned yields that it conducts in that calendar year.

Paragraph 2(b) provides that for subsequent calendar years, if a Party conducts at least one test, but does not conduct at least one test having a planned yield exceeding 50 kilotons, the other Party has the right to use the hydrodynamic yield measurement method with respect to that test, which would be selected by the Testing Party as one of those having the highest planned yields that it conducts in the given calendar year.

Paragraph 2(c) provides that if a Party postpones from one year to the next a test having a planned yield of 50 kilotons or less, with respect to which the Verifying Party had notified the Testing Party of its intent to exercise its right to use the hydrodynamic yield measurement method, then the right of the Verifying Party to use that method on the postponed test is retained, as an additional entitlement in the year in which the postponed test is conducted.

Paragraph 2(d) provides that if a Party opens a new test site, the Verifying Party shall have the right to use the hydrodynamic yield measurement method on two tests in each calendar year for five years from among the tests the Testing Party conducts at that new site beginning with the first test the Testing Party conducts. If the Testing Party does not conduct at least two tests having a planned yield exceeding 50 kilotons at the new site in each of those years, the Verifying Party has the right to use the hydrodynamic yield measurement method on two tests selected by the Testing Party from among those tests having the highest planned yields that it conducts at the new site. This right does not apply to the new area of a test site in the case of a change in the boundary of an existing test site.

Paragraph 3 establishes timing and spacing requirements for tests involving more than one explosion when the Verifying

Party has notified the Testing Party of its intent to use the hydrodynamic yield measurement method. In such a case, unless the Parties agree on other verification measures for the test, this paragraph requires the Testing Party to locate each explosive canister in the test at least 50 meters from any other explosive canister in that test, and to time each explosion so as to permit hydrodynamic measurements for at least 30 meters in the associated satellite hole for each explosion.

Paragraph 4 provides that, if the Verifying Party has notified the Testing Party of its intent to use the hydrodynamic yield measurement method with respect to a specific test, if the Testing Party conducts the test in more than one emplacement hole, only one such hole may have characteristics, or may contain explosive canisters having characteristics, different from the characteristics that are associated with a test of standard configuration as described in Section V, unless the Parties agree on verification measures for that test.

Paragraph 5 establishes two timing constraints on testing. First, the Testing Party may not conduct a test having a planned yield over 35 kilotons within two seconds of any other test having a planned yield exceeding 35 kilotons, unless the Parties agree on verification measures for those tests.

Second, no test may be conducted within 15 minutes before or after a reference test, unless the Parties otherwise agree.

Paragraph 6 prohibits a Party from conducting a test having a planned yield over 35 kilotons in a cavity whose volume exceeds 20,000 cubic meters, unless the Parties agree on verification measures for that test.

By virtue of paragraph 7, if the Testing Party conducts a test of non-standard configuration (as defined in Section V) having a planned yield exceeding 50 kilotons, and if the Verifying Party notifies the Testing Party of its intention to use the hydrodynamic yield measurement method with respect to that test, the Testing Party must also provide, if the Verifying Party so requests, a "reference test" meeting the criteria specified in Section V. The Verifying Party may use this test to compare the yields of the reference test and the associated test of non-standard configuration, measured through use of the hydrodynamic yield measurement method, with the yields of the reference test and associated test of non-standard configuration, measured by means of its national technical means. The Testing Party is obligated to provide the requested reference test (which may be a previously conducted test meeting the specified criteria) even if the Verifying Party does not actually carry out hydrodynamic measurements of the test of non-standard configuration.

Paragraph 8 contains certain limitations on the rights to require a reference test. Subparagraph (a) provides that if the Testing Party announces a reference test and the Verifying Party elects not to use the hydrodynamic measurement method with respect to that reference test, the Verifying Party shall forfeit its right to a reference test for future tests of non-standard configuration that would have been associated with that test, provided the Testing Party actually conducts the announced reference test. Subparagraph (b) provides that at any given time the Testing Party may have identified only one reference test that is not associated with a particular test of non-standard configuration. The purpose of this provision is to prevent the Testing Party from identifying a number of reference tests, for each one of which the Verifying Party would be compelled to use the hydrodynamic yield measurement method without knowing which test of non-standard configuration, if any, would ever be referenced, and to prevent the Testing Party from taking advantage of a decision by the Verifying Party not to use the hydrodynamic yield measurement method by subsequently locating future tests of non-standard configuration within the range of the reference test. As a result of subparagraph (b), the Testing Party will never have more than one reference test "on the books" at any given time that is not associated with a test of non-standard configuration, and the Verifying Party will not have to decide whether or not to use the hydrodynamic yield measurement method on more than one test at a time without knowing the identity of the test of non-standard configuration for which it would serve as a reference.

Subparagraph (c) provides that if the Verifying Party elects not to use the hydrodynamic yield measurement method with respect to a reference test announced as being associated with a previously conducted test of non-standard configuration, the Verifying Party shall forfeit its right to any reference test for that previously conducted test of non-standard configuration whether or not the Testing Party actually conducts the announced reference test.

Paragraph 9 provides that once the Verifying Party has provided its initial notification as to which, if any, verification activities it intends to carry out, that notification cannot be changed, other than to delete activities, unless the Testing Party either changes the location of the test by more than one minute of latitude or longitude, or changes the planned yield from 50 kilotons or less to more than 50 kilotons. In either of those cases, the Verifying Party has the right to provide a revised notification and to carry out any verification activity originally available under the Protocol. The Testing Party would also be prohibited from conducting the changed test for 180 days, unless the Parties otherwise agreed.

Paragraph 10 establishes that Designated Personnel have the right to carry out verification activities 24 hours a day, consistent with safety requirements, at the test site or Designated Seismic Stations. This paragraph also requires that operations requiring the participation of personnel of both Parties be carried out in a manner consistent with the Testing Party's normal technical operations and practices at the test site or Designated Seismic Station. Designated Personnel are prohibited from interfering with activities of personnel of the Testing Party, and are also held responsible for their own equipment and operations. Paragraph 10 guarantees that the Testing Party is not required to delay a test because of a malfunction of Verifying Party equipment or inability of Designated Personnel to carry out their functions, unless the Testing Party caused the problem. Paragraph 10(b)(ii) gives the Testing Party full responsibility for preparation and conduct of a test, and provides that it shall have exclusive control over it.

Paragraph 11 provides that if the Verifying Party has notified the Testing Party of its intent to carry out verification activities with respect to a test, the Testing Party may not change the timing of its operations related to the conduct of that test if those changes would preclude or significantly limit the ability of Designated Personnel to carry out their verification rights provided in this Protocol. If the Verifying Party determines that such is the case, the Coordinating Group must meet to agree on a revised coordinated schedule that will ensure the rights of both Parties. In the absence of agreement, the original schedule will continue to govern as if such change had never been proposed. Either Party may also request that any question be taken up in the BCC in accordance with the provisions of the Protocol.

SECTION IV.

Section IV sets forth the procedures and requirements covering the provision of notices and information, changes in information previously provided, operations leading up to a test, and changes in the configuration or certain essential characteristics of a test.

Paragraph 1 requires that unless otherwise specified in the Protocol, all notifications shall be transmitted through the Nuclear Risk Reduction Centers (NRRC). Other information provided under the Protocol may also be transmitted, if appropriate, through these Centers. All notices must be in writing.

The Section as a whole establishes the deadlines and requirements governing notifications and provision of information relating to nuclear tests and verification activities. The basic structure is as follows:

Time of Notification	Content of Notification
June 1 (para 2)	Testing Party provides projected number of tests covered by the Protocol for the next calendar year, and indicates whether the number is sufficient to meet the requirements of paragraph 2 of Section III.
Entry into force (para 3)	Testing Party provides the information listed in paragraph 2 for a period of up to 18 months after entry into force, depending on the date of entry into force.
No less than 200 days prior to test (para 4)	Testing Party provides information on date, location, and configuration of a specific test and whether it will serve as a reference test.
Within 20 days of the notification required by para 4 (para 5)	Verifying Party notifies Testing Party whether or not it will carry out verification activities, and if so, which.
If the Testing Party indicates it will carry out verification activities, at least 20 days prior to test (paras 7, 8, 9)	Testing Party provides more specific information on test geology and configuration.
Two days prior to the test (paras 13 and 19)	Testing Party provides notification of period of readiness, and precise planned time of detonation.
One hour following detonation (para 18)	Testing Party provides actual time of detonation to Designated Personnel.

No less than 3 days following the test (para 19)	Testing Party provides actual time of detonation to nearest 0.1 sec.
Within one year following test (para 25)	At request of Verifying Party, clarification of information, to be provided within 30 days.

Paragraph 2 provides that by June 1 of a given year each Party must inform the other Party of the number of tests having a planned yield exceeding the Protocol notification thresholds or otherwise subject to the Protocol that it plans to conduct in the following calendar year. Paragraph 3 requires that on the date of entry into force of the Treaty, each Party must provide such a schedule covering the remainder of the calendar year in which the Treaty enters into force, and, if entry into force is after June 1, covering the following calendar year as well.

Paragraph 4 requires that at least 200 days prior to the planned date of any test for which verification rights are provided by the Protocol, the Testing Party shall provide the Verifying Party with the most accurate available information on the planned date and location of the test; whether the planned yield exceeds 35 kilotons, or exceeds 50 kilotons; the configuration of the test and whether it will serve as a reference test; the planned date of beginning of emplacement; the planned depth of each emplacement hole; the type of rock in which the test will take place; and the depth of the water table.

Within 20 days following the receipt of the information specified in paragraph 4 for a specific test, paragraph 5 requires the Verifying Party to indicate in a single notification, whether it will carry out verification activities with respect to that test; and, if so, it must specify the type or types of verification methods it will use, hydrodynamic, seismic, or on-site inspection.

Paragraph 6 contains a specific notification obligation for reference tests. If the Verifying Party, having previously notified the Testing Party of its intention, pursuant to paragraph 5, to use the hydrodynamic yield measurement method with respect to a test of non-standard configuration, requires a reference test for such test of non-standard configuration, it must make a request therefor in the Coordinating Group established for that test under Section XI. If a reference test is required, paragraph 6 requires the Testing Party then to notify the Verifying Party as to how it will provide the reference test, either by identifying a previous qualifying test or by identifying a future test that the Verifying Party may measure by use of the hydrodynamic yield measurement method. In any case, a test may serve as a reference test only if the Verifying Party either applied or had the opportunity to apply the hydrodynamic yield measurement method.

Paragraphs 7, 8, and 9 require the Testing Party to provide additional information, depending on the type of verification activity to be carried out, at least 120 days prior to the planned date of the test. If the Verifying Party indicates that it intends to use the hydrodynamic yield measurement method, paragraph 7 requires the Testing Party to provide information describing geological and geophysical characteristics of the test location; planned cross-sectional dimensions of each emplacement hole; configuration of known cavities larger than one cubic meter in the hydrodynamic measurement zone; stemming materials to be used; any plans to case emplacement and satellite holes and, if so, the casing materials to be used; a topographic map with a scale no smaller than 1:25,000 and contour intervals of 10 meters or less; overall drawings showing external dimensions of explosive canisters, choke sections, pipes and cableways connected to the explosive canister; locations for gas-blocking devices on the Verifying Party's cables; and whether the Testing Party will provide satellite communications from the test site.

Paragraph 8 deals with the information required when the Verifying Party notifies the Testing Party of its intent to use the seismic method. This is the same information required in the case of on-site inspection regarding geological and geophysical characteristics of the test site, planned cross-sectional dimensions of each emplacement hole, and location and configuration of known cavities larger than 1000 cubic meters within 300 meters of any emplacement point.

If the Verifying Party notifies the Testing Party of its intent to carry out on-site inspection, paragraph 9 requires the Testing Party to provide information on geological and geophysical characteristics of the test site; planned cross-sectional dimensions of each emplacement hole; location and configuration of known cavities larger than 1000 cubic meters within 300 meters of any emplacement point; plans for casing emplacement holes and description of casing materials; a topographic map with a scale no smaller than 1:25,000 and contour intervals of 10 meters or less; and whether the Testing Party will provide satellite communications from the test site. The scope of certain information dealing with features surrounding an emplacement hole required to be provided in accordance with this paragraph is different from the scope of similar information required to be provided in accordance with paragraph 7. The requirements set forth in paragraph 7 are expressed by reference to each hydrodynamic measurement zone, while for on-site inspection the zone of interest is defined in paragraph 9 to be the region within a radius of 300 meters from the planned emplacement point.

Paragraphs 10-12, 16-17, and 19-24 require the Testing Party to provide notice of changes in information previously provided, and prescribe certain notification requirements and constraints on the operations of the Testing Party to enable the Verifying Party to exercise effectively its verification rights as contemplated by the Protocol.

Paragraph 10 provides that the Testing Party shall immediately notify the Verifying Party of any change in the planned number of tests covered by the Protocol or in the information dealing with particular tests furnished under paragraph 4 and, if the Verifying Party has notified the Testing Party of its intent to exercise any of its verification rights, the information required to be furnished in accordance with paragraphs 6-9. The obligation to inform the Verifying Party of changes in information furnished in connection with a particular test is limited, in that certain changes need not be notified unless the Verifying Party has notified the Testing Party of its intent to carry out verification activities. In some cases, the Testing Party is required only to inform the Verifying Party of changes in information that are relevant to the particular verification activity selected. For example, the Testing Party must notify the Verifying Party of a change in the configuration of a test only if the Verifying Party has indicated its intention to use the hydrodynamic yield measurement method with respect to that test. In addition, changes in the information furnished in accordance with paragraphs 7, 8, and 9 with respect to the three types of verification activities, (hydrodynamic measurements, seismic measurements and on-site inspection, respectively,) need be provided only if, and to the extent that, the Verifying Party has indicated that it intends to conduct one or more of such activities.

Paragraph 11 requires the Testing Party also immediately to notify each Designated Personnel Team Leader of any change in the planned date of the test and those changes specified in paragraph 10 that relate to the particular verification activities that are being carried out. This requirement only applies when Designated Personnel are in the territory of the Testing Party. It avoids the delays that would occur if the required notices were only transmitted through the NRRC in the capital of the Verifying Party, and then had to be relayed back to operational personnel at the test site or Designated Seismic Stations in the territory of the Testing Party.

Paragraph 12 requires the Testing Party to notify both the Verifying Party and Designated Personnel Team Leaders (if Designated Personnel are in the Testing Party's territory) of any change in the timing of its operations that could affect the coordinated schedule of test and verification activities that will be established by the Parties in the Coordinating Group before the verification activities begin.

Paragraphs 13-19 deal with notifications and operations near the time of the test. Paragraph 13 deals with the situation in which Designated Personnel are already present at the test site or Designated Seismic Stations. Paragraph 13(a) requires that, no less than 48 hours prior to the planned time of the test, the Testing Party must notify each Designated Personnel Team Leader, in writing, of the planned time of the test to the nearest second, and the time for the beginning of the "period of readiness." If the Testing Party changes the planned time of the test, paragraph 13(b) requires that it immediately notify each Designated Personnel Team Leader, in writing. Paragraph 13(c) requires the Testing Party to conduct the test only during a period of readiness; paragraph 13(d) provides that the period of readiness can begin no earlier than six days after completion of stemming of the hydrodynamic measurement zone of each satellite hole, if the Verifying Party is conducting hydrodynamic yield measurements, and no more than five days before the planned date of the test, if the Verifying Party is conducting seismic measurements. Paragraph 13(e) allows the Testing Party to terminate the period of readiness at any time, in which case it must immediately notify each Designated Personnel Team Leader, in writing, that the period of readiness has been terminated. Further, as provided in paragraph 13(f), if the Testing Party terminates this period of readiness or changes the time for its beginning, it must notify each Designated Personnel Team Leader, in writing, of the time for beginning a new period of readiness at least 12 hours before such new period begins. All notifications in this and the following paragraphs are required to be provided in Universal Time Coordinated (UTC), as well as local time.

When the Testing Party has provided notification in accordance with paragraphs 13(a) and (b), paragraph 14 specifies that it may advance the actual time of the test, without further notification, by no more than five minutes.

After the Testing Party has started the event readiness signal (a signal required by paragraph 10(b) of Section V to be initiated in the interval of seven to 15 minutes before the test), paragraph 15(a) provides that if the Testing Party then delays the test and terminates the event readiness signal one second or more prior to the planned time of the test, it may then conduct the test, without further notification, at any time within 60 minutes after the originally planned time, provided it generates a new event readiness signal. If, on the other hand, it delays the test but does not terminate the event readiness signal at least one second prior to the planned time of the test, then, in accordance with paragraph 15(b), the Testing Party must end the event readiness signal, and cannot begin a new one within 20 minutes of the planned test time. In that case, the Testing Party must notify each Designated Personnel Team Leader, in writing, of the new planned time of the test at least 10 minutes prior to the beginning of a new event readiness signal.

Paragraph 16 requires that if the Testing Party delays the test by more than 60 minutes after it has provided notification in accordance with paragraphs 13(a) and (b), then it must notify each Designated Personnel Team Leader, in writing, of the new planned time of the test at least 30 minutes prior to that new planned time. Further, paragraph 17 requires that if a test is delayed by more than three hours during a period of readiness, the Testing Party must notify each Designated Personnel Team Leader, in writing, of the estimated period of delay.

Paragraph 18 requires the Testing Party to provide a notice specifying the actual time of the test, rounded to the nearest 0.1 second, to each Designated Personnel Team Leader within one hour following the test.

Paragraph 19 further provides that once the Testing Party has provided notification, at least 200 days in advance, of a test subject to the verification procedures of the Protocol, then it must provide certain additional notifications to the Verifying Party, whether the Verifying Party elects to pursue any of its verification rights or not. No less than 48 hours prior to the planned time of the test, the Testing Party must provide notification of the planned time of the test to the nearest second, and if it then delays the planned time of the test by more than 24 hours, it must provide notification of a new planned time to the nearest second. Further, following the test it must notify the Verifying Party of the actual time of the test to the nearest 0.1 second, referenced to UTC.

Paragraph 20 requires notification by the Testing Party of any change in the location of a test by more than one minute of latitude or longitude, or in the planned yield of a test from 50 kilotons or less to more than 50 kilotons. In the event of any such change the Testing Party must give the Verifying Party an opportunity to revise its decision regarding verification activities. Accordingly, after the required notice of any such change, the Verifying Party has 20 days to revise its earlier notification regarding its intent to carry out verification activities. It could, for example, decide to change from carrying out on-site inspection, or doing nothing, to carrying out hydrodynamic yield measurement, or vice versa.

In addition, paragraph 20 provides that if the Verifying Party, in its revised notification, has notified the Testing Party of its intention to use the hydrodynamic yield measurement method, the Testing Party is required to furnish the same information that it would have been required to furnish if the Verifying Party had initially decided to carry out the activities elected in its revised notification. Additionally paragraph 21 provides that if the Verifying Party has notified the Testing Party of its intention to use the hydrodynamic yield measurement method, the beginning of emplacement of sensing elements and cables may not start until at least 90 days after notification by the Testing Party of the change in location, unless the Parties otherwise agree. This obligation is independent of the obligation established by paragraph 9 of Section III.

Paragraphs 22, 23, and 24 deal with changes in the configuration of a test or an increase in the number of emplacement holes or explosive canisters in a test.

Paragraph 22 confirms the right of the Testing Party to change the configuration of a test without notice if the Verifying Party has elected not to carry out hydrodynamic yield measurements of that test. On the other hand, if the Verifying Party has initially elected to carry out hydrodynamic yield measurements of that test, paragraph 23 requires the Testing Party to notify the Verifying Party of any change in configuration or increase in number of emplacement holes or explosive canisters in the test. Within five days of such a change notice, the Verifying Party is required to indicate whether it will revise its initial decision and whether it deems that the change would either preclude or significantly limit the exercise of its verification rights. If it makes such a determination, the Coordinating Group is required to meet immediately and seek to revise the coordinated schedule to protect the rights of both Parties. If the Parties cannot agree on a revised coordinated schedule within 15 days of the Testing Party's notice of the change in configuration or number of holes or canisters, then the change notice will be treated as if it were the original notice of a new test so that the Verifying Party may submit a new notification regarding its intention to carry out verification activities, and the test may not be conducted for at least 180 days after the date of the Testing Party's notice of change.

Paragraph 24 provides similar rights and constraints for the situation in which the Verifying Party has elected to carry out on-site inspection. The rights and constraints, however, apply only when the Testing Party increases the number of explosive canisters or emplacement holes (the additional changes encompassed within paragraph 23, such as a change in test configuration, would not impact on-site inspection rights). As in paragraph 23, the Verifying Party has five days to respond to the change notice. If it determines that the change would significantly limit the exercise of its verification rights, it may so notify the Testing Party and force the Coordinating Group to consider a revision to the coordinated schedule. In the absence of agreement within 15 days following the Verifying Party's notice, the Testing Party's notice is treated as an initial notice of a test, and the test may not be conducted for at least 165 days thereafter.

Paragraph 25 permits the Verifying Party to request clarification of any point of furnished information within one year following the test. It also obligates the Testing Party to provide a clarification in response to any such request in the shortest possible time and in no event more than 30 days following receipt of the request.

SECTION V.

Section V sets forth the procedures, conditions, obligations, and rights of the Parties that apply if the Verifying Party elects to use the hydrodynamic yield measurement method.

Paragraph 1 defines the dimensions and locations of the zone in which the Verifying Party may carry out hydrodynamic yield measurements of the yield of a test. The parameters of the zone differ depending on whether a test is of "standard" or "non-standard" configuration, as described in paragraphs 2-3, and on whether a test is in a vertical hole or a horizontal hole (such as one excavated into the side of a mountain). The zone parameters for a test of standard configuration are also applicable to a test of non-standard configuration having a planned yield of 50 kilotons or less. If a test includes more than one explosion (whether it is of standard or non-standard configuration), there is a different hydrodynamic measurement zone for each explosive canister.

For a test of standard vertical configuration, the zone is cylindrical with a diameter of 25 meters and a length extending from a point 30 meters below the end of the emplacement hole upward for 130 meters above that point. The axis of the cylindrical zone is midway between the axis of the emplacement hole and the nearby dug or drilled satellite hole containing the cables of the Verifying Party that are used to carry out hydrodynamic yield measurements.

The zone for a test of standard horizontal configuration is cylindrical with a diameter of 25 meters and a length extending from a point 15 meters beyond the end of the emplacement hole (which in the case of a horizontal configuration is a tunnel) for a distance of 80 meters towards the entrance to the emplacement hole. The axis of the cylindrical zone, as in the case of a vertical configuration, is midway between the axes of the emplacement and satellite holes.

For a test of non-standard vertical configuration having a planned yield exceeding 50 kilotons, the zone is cylindrical with a diameter of 200 meters and a length extending from a point 30 meters below the end of the emplacement hole to a point 100 meters above the center of the explosive canister. The axis of the cylindrical zone in this case is the axis of the emplacement hole.

The zone for a test of non-standard horizontal configuration having a planned yield exceeding 50 kilotons is a cylinder with a diameter of 130 meters and a length extending from a point 15 meters beyond the end of the emplacement tunnel to a point 65 meters from the center of the explosive canister towards the entrance to the emplacement tunnel. Its axis is the same as the axis of the emplacement hole. If any test consists of more than one explosion, there will be one hydrodynamic measurement zone for each explosive canister.

Paragraph 2 describes the characteristics of a "standard" vertical test configuration. In order for a test to be considered as having a standard vertical configuration the emplacement hole must be vertical and cylindrical, and must satisfy certain diameter requirements. The bottom of the hole must be plugged with stemming material meeting specified density and thickness requirements. That plug must form the end of the emplacement hole for the deepest explosive canister in the test (like a test of non-standard configuration, a test of standard configuration may include more than one explosive canister). Each explosive canister must be within specified size limitations. Pipes and cableways connected to an explosive canister must pass through a choke section meeting specified diameter, thickness, location, and density requirements, and their areas cannot exceed specified limits.

Voids in or nearby the emplacement hole or a satellite hole, but outside an explosive canister, a choke section, diagnostic canisters or associated cables or pipes, having a volume exceeding a defined maximum limit, must be filled with stemming material meeting specified density requirements in order to ensure accurate hydrodynamic data. Finally, the distance between the emplacement hole and the satellite hole must be no more than the distance from the satellite hole to any other drilled hole or excavation within the hydrodynamic measurement zone.

Paragraph 3 provides that for a test to be considered of standard horizontal configuration, the emplacement hole or tunnel must be horizontal with specified maximum dimensions. The end of the tunnel must be unsupported native rock or be plugged with stemming material meeting the same requirements as are applicable to a test of standard vertical configuration. Paragraph 3 also establishes criteria for the length, size, and location of each explosive canister, specifications for pipes and cableways, choke sections, voids, and the minimum required distance between an associated satellite hole and any other tunnel or excavation.

As in the case of a test of standard vertical configuration, a test of standard horizontal configuration may include more than one explosive canister and more than one emplacement hole. Any test that does not have the characteristics described in either paragraph 2 or paragraph 3 is considered of non-standard configuation.

Paragraphs 4 and 5 establish the rights and procedures applicable to a test of standard configuration (whether vertical or horizontal) and an explosion having a planned yield of 50 kilotons or less (whether part of a test of standard or non-standard configuration). Paragraph 4(a) requires the Testing Party to drill or excavate a satellite hole meeting specified requirements. The Testing Party may prepare the satellite hole at any time, including before the arrival of Designated Personnel. For a test of horizontal configuration containing more than one explosive canister, the satellite hole may be a single hole or a series of separate consecutive segments associated with separate hydrodynamic measurement zones. The satellite hole must also be at least six meters from any other drilled or excavated cavity or hole.

Paragraph 4(b) provides that the Designated Personnel have the right to observe the plugging of the end of the emplacement hole and to retain a sample of the stemming material. Paragraph 4(c) provides that they have the right to survey and measure each satellite and each emplacement hole, under observation of Testing Party personnel and with their assistance if requested. Paragraph 4(d) gives Designated Personnel the right to install their equipment, under the observation of Testing Party personnel and with the latter's assistance if requested, and to operate that equipment. The location of recording and command and monitoring facilities of the Verifying Party, as well as the Testing Party's instrumentation facility, will be determined in the Coordinating Group. The Testing Party is required to prepare areas in accordance with agreed requirements for these facilities, plus cable supports and cableways exclusively for protection of the electrical cables of the Verifying Party that will transmit the data regarding yield of the explosion. The personnel of each Party have access to the electrical cables and their cableways only under observation of the other Party. Designated Personnel are guaranteed access to those cables at all times.

Paragraph 4(e) gives Designated Personnel the right to use their own power sources or to use power from the standard electrical network at the test site.

Paragraph 4(f) provides that the Verifying Party may install up to six sensing elements and cables and associated equipment in each satellite hole and that this equipment of the Verifying

Party shall be the only equipment permitted in a satellite hole. This paragraph also prescribes that it must be installed at least 30 meters below the end of a vertical emplacement hole or 15 meters beyond the end of a horizontal emplacement hole. Personnel of both Parties may measure the location of this equipment. Paragraph 4(g) gives Designated Personnel the right to conduct a final survey and measurement of each satellite hole after installation of sensing elements and cables.

Paragraph 4(h) requires the Testing Party, under observation of Designated Personnel, to fill specified voids and provide Designated Personnel with a sample of each stemming material used. It also establishes criteria for the stemming material.

Paragraph 4(i) establishes the right of Designated Personnel to observe stemming of each hydrodynamic measurement zone in the emplacement hole, and to receive a sample of the stemming material used.

By virtue of paragraphs 4(j) and 4(k), the Testing Party may case or line emplacement holes and, subject to agreement on specific details, satellite holes.

Paragraph 5 sets forth the rights and procedures applicable to the preparations for the use of the hydrodynamic method in tests and explosions covered by paragraph 4.

Paragraph 5(a) obligates Designated Personnel to provide the Testing Party with a description of their recording format and computer programs upon their arrival at the test site. The description must be in a form that will enable the Testing Party to read digital data in the event that digital recordings of hydrodynamic data will be made by Designated Personnel.

Paragraph 5(b) requires the Testing Party to provide Designated Personnel with the results of any available studies of rock extracted from holes in the area of the test, and of logging and geodetic measurements relevant to geology and geophysics of each hydrodynamic measurement zone.

Paragraph 5(c) gives Designated Personnel the right to conduct specified logging, surveys and measurements in the emplacement hole and associated satellite hole and measurements to determine the existence and depression of nearby voids, regardless of whether the emplacement hole is vertical or horizontal. Surveys are done in both holes, while logging is done in the hole chosen by the Testing Party. All logging data, geometrical measurements, and calibration data must be duplicated and a copy given to the Testing Party pursuant to subparagraph 5(d) before Designated Personnel leave the test site.

Designated Personnel also have the right, pursuant to paragraph 5(e), to receive, at their choice, core samples, rock fragments, or both, which shall be extracted at specified locations within the emplacement hole or satellite hole. These core samples or rock fragments are necessary if accurate hydrodynamic yield measurements are to be obtained. The Testing Party has the right to select the hole from which they will be extracted. The amount of rock extracted is also prescribed, as is the diameter and depth of drilled holes in the case of horizontal emplacement holes.

Paragraph 5(f) provides that the Testing Party decide which Party will extract the core samples or rock fragments. If the Testing Party decides not to do so, or does so but fails to meet the specific requirements, paragraph 5(g) specifically guarantees Designated Personnel the right to do so, using their own equipment. In either case the other Party's personnel may observe the extraction. If the Testing Party has cased a total of 20 meters or more of either or both the emplacement hole and the satellite hole in the hydrodynamic measurement zone, paragraph 5(h) gives Designated Personnel the right to obtain logging measurements and core samples or rock fragments from an uncased hole that can provide information equivalent to that which they would have received in accordance with paragraphs 5(c), (e), (f), and (g). Paragraph 5(h) also specifies the size and location of the new, uncased hole that the Testing

Party must drill if both emplacement and satellite holes are cased. Designated Personnel have the right to retain the core samples and rock fragments extracted as prescribed above, in accordance with paragraph 5(i). Paragraph 5(j) provides that the Testing Party determines when logging, surveying, measuring, and extracting takes place, and that the right of Designated Personnel to perform those activities includes a period up to 25 days. The Testing Party is prohibited from emplacing any explosive until all those activities have been completed.

Paragraphs 6 and 7 describe procedures relating to use of the hydrodynamic yield measurement method with respect to explosions that have a planned yield exceeding 50 kilotons and that do not fit the criteria for tests of standard vertical or standard horizontal configuration set forth in paragraphs 2 or 3. These provisions are comparable to those set forth in paragraphs 4 and 5 with respect to tests of standard configuration. The principal difference is that paragraph 6(a) entitles the Verifying Party to three satellite holes if it so chooses rather than one as in the case of a test of standard configuration and gives it the right to specify the location of the second and third satellite holes, within certain parameters. In accordance with paragraph 6(a)(ii), Designated Personnel have the right to specify these locations without the restrictions imposed by paragraph 4(a) in the case of a test of standard configuration. They have the right to receive core samples or rock fragments and conduct logging from the emplacement hole and all satellite holes. Moreover, they have the right pursuant to paragraph 6(e) to install up to six sensing elements and cables in each satellite hole as well as up to six transducers with no more than 14 cables for information transmission and power supply. However, there cannot be more than 20 cables in each satellite hole. In addition, paragraph 7(c)(v) gives the Verifying Party the right to conduct magnetic surveys to collect information necessary for the installation and positioning of transducers in vertical satellite holes and drilled horizontal satellite holes. Finally, in the case of tests of non-standard configuration having a planned yield exceeding 50 kilotons, paragraph 7(h) provides certain additional requirements regarding the provision of one or more uncased holes, if the Testing Party has cased specified portions of any vertical emplacement or satellite hole.

Paragraph 8 requires the Testing Party to provide a "reference test," meeting stated criteria, if the Verifying Party notifies the Testing Party of its intention to use the hydrodynamic yield measurement method with respect to a test of non-standard configuration having a planned yield exceeding 50 kilotons, and if the Verifying Party indicates that it requires a reference test. There are five criteria for a reference test. First, it must have a planned yield exceeding 50 kilotons. Second, it must be of standard configuration (i.e., have the characteristics described in paragraph 2 or 3). Third, it must have a single explosive canister. Fourth, it must meet specified spacing and location requirements designed to ensure that the seismic measurements derived from the reference test and the associated test of non-standard configuration can be meaningfully compared. Finally, it must have been conducted prior to, or be conducted within 12 months following, the associated test of non-standard configuration.

Paragraph 9 deals with activities of Designated Personnel at the test site. Paragraphs 9(a) and 9(b) guarantee Designated Personnel access to the test locations along agreed routes and access to their equipment from the time of delivery at the test site until transfer to Testing Party personnel for inspection after it has been used, in accordance with Section VIII, paragraph (7)(i).

With respect to a test of standard configuration, or a test of non-standard configuration having a planned yield of 50 kilotons or less, paragraph 9(c) gives Designated Personnel the right to measure the external dimensions, and to inspect visually the external structure, of each explosive canister and choke section, to confirm by direct measurement that the choke section conforms to specifications, and to observe the emplacement and stemming process from the time the explosive canister is lowered into a vertical emplacement hole, or after the canister has been emplaced in a horizontal emplacement hole. Paragraph 9(d) provides the same rights with respect to explosions over 50 kilotons having characteristics different from those associated with a test of standard configuration, and includes procedures for a test in a cavity, including the right to measure the dimensions of the cavity.

Paragraphs 9(e) and 9(f) give Designated Personnel the right, with respect to tests of standard or non-standard configuration having a vertical emplacement hole, to unobstructed visual observation of the entrances to emplacement and satellite holes from completion of stemming of satellite holes and the hydrodynamic measurement zone of the emplacement hole, until departure of all personnel from the site prior to the test.

In the case of a horizontal emplacement hole, whether the test is of standard or non-standard configuration, these paragraphs give Designated Personnel the right to unobstructed visual observation of their sensing elements and cables until stemming of the satellite hole in which they are placed, and of connecting electrical cables until they are installed in protective cableways. Designated Personnel also have the right to observe the emplacement hole entrance from the time of stemming of satellite holes and the hydrodynamic zone of the emplacement hole until departure of all personnel prior to the test.

Paragraphs 9(g) through 9(m) give Designated Personnel the right to monitor and operate their equipment used to carry ou hydrodynamic yield measurements.

Paragraph 9(g) gives Designated Personnel the right to monitor, by electrical means, the integrity and performance of the Verifying Party's sensors, transducers, and connecting cables; recording facility; trigger conditioners and associated terminal conversion devices; command and monitoring facility; and all above-ground electrical and fiber optic cables. This paragraph also gives Designated Personnel the right to observe continuously all their above-ground cables and the cableways in which they are installed from the time emplacement of sensors, transducers, and cables in a satellite hole begins until all personnel are withdrawn from the immediate area of the test prior to the test. Following this withdrawal of all personnel and until reentry after the test, Designated Personnel can observe the surface area containing their hydrodynamic measuring equipment by means of closed-circuit television. (Paragraph 1(j) of Section VIII provides that the Verifying Party may supply the closed-circuit television equipment, if the Testing Party chooses not to do so.)

Paragraph 9(h) gives Designated Personnel a similar right to monitor the integrity and performance of their equipment from within their command and monitoring facility, from the time it is put into use until hydrodynamic data have been acquired, recorded, authenticated, and copied; that is, the command and monitoring facility remains occupied by Designated Personnel during the test. (Paragraph 11(d) of this Section also gives the Testing Party the right to have two of its personnel present in the Verifying Party's command and monitoring facility for a specified period around the time of the test.)

Paragraphs 9(i) and (j) give Designated Personnel the rights to transmit command signals from their command and monitoring facility required for operation of their hydrodynamic recording facility or facilities, and to use the telemetry system of the Testing Party, if such a system is used at the test site, to carry monitoring, control or command, and data signals. Alternatively, Designated Personnel may choose to use their own above-ground electrical and fiber optic cables for these purposes.

Paragraph 9(k) provides that Designated Personnel have the right to carry out hydrodynamic yield measurements and record the hydrodynamic data.

Paragraphs 9(l) and (m) give Designated Personnel the right to transmit hydrodynamic yield measurement data from each recording facility to their command and monitoring facility and, following the test, to reenter the area containing each recording facility at the same time that personnel of the Testing Party reenter the area. Then, following agreed procedures, Designated Personnel, accompanied by Testing Party personnel, have the right to reenter their recording facilities to retrieve and verify the authenticity of their recorded data, and assess the performance of their equipment during data recording and transmission.

Paragraph 10 deals with notifications, actions, and responsibilities of the Parties during the carrying out of hydrodynamic yield measurements. Paragraph 10(a) requires the Testing Party to notify the Designated Personnel Team Leader, in writing, of the beginning of the period of readiness and the planned time of the test. Paragraph 10(b) requires the Testing Party to produce the event readiness signal, beginning at a time specified by the Verifying Party within an interval of seven to 15 minutes prior to the planned time of the test. The Parties will agree on the parameters of this signal, and how it will be transmitted and received.

Paragraph 10(c) gives Designated Personnel the right to generate a timing reference signal using trigger conditioner devices approved by the Parties. The timing reference signal may be generated, transmitted, and used by Designated Personnel without intervention by Testing Party personnel. Paragraph 10(d) gives Designated Personnel the right to install these trigger conditioner devices, under observation of personnel of the Testing Party, and test and monitor their operation. Testing Party personnel have the right to monitor their operation, and to monitor and record the actual reference signal. Personnel of neither Party may have physical access to the devices except under observation of personnel of the other Party.

Paragraph 10(e) requires the Testing Party to provide, at the Verifying Party's request, an electrical pulse corresponding to the moment of explosion (zero-time) for each explosion of the test. The parameters of this signal, and the means of transmitting and receiving it, shall be agreed upon by the Parties. Paragraph 10(f) gives the Testing Party exclusive control over the generation of the event readiness and zero-time signals.

Paragraph 10(g) requires Designated Personnel, under Testing Party observation, to install an anti-intrusiveness device, supplied by the Testing Party from those approved by both Parties, in each of their cables from each satellite hole to their hydrodynamic recording facility, that shall interrupt the transmission of any signal unrelated to the hydrodynamic yield measurements, while not interfering with the Verifying Party's recording of hydrodynamic yield measurement data. From the time these devices are installed until the final dry run, personnel of either Party have the right to test and monitor their operation and to have physical access to them only under observation of personnel of the other Party. Sole control over triggering the devices is transferred to the Testing Party when all personnel depart the test location prior to the test.

Paragraphs 10(h), (i), and (j) deal with grounding the equipment of the Verifying Party, to be done by Designated Personnel under observation of Testing Party personnel. The grounding system shall be under joint control of both Parties.

Paragraph 10(k) gives Designated Personnel the right to install isolation transformers at the input of each anti-intrusiveness or trigger conditioner device. From the time of installation until the test, personnel of either Party may have physical access to them only under observation of personnel of the other Party.

Paragraph 10(l) gives the Testing Party the right to install and operate, under its exclusive control, a facility containing instrumentation for monitoring and recording various signals, controlling and monitoring the operation of the anti-intrusiveness devices, and for the transmission of trigger and control signals.

Paragraph 10(m) requires Designated Personnel, upon their arrival at the test site, to provide the Testing Party with a block diagram of the equipment configuration for hydrodynamic measurements indicating any changes from that approved by the Testing Party as part of the equipment familiarization inspection provided for in Section VIII. Prior to the final dry run, Designated Personnel must notify the Testing Party, in writing, of any additional changes in this block diagram. The Testing Party has the right to disapprove changes, but must give specific reasons, in writing, for disapproval. If the change is disapproved, Designated Personnel must reconfigure their equipment so as to conform to the original block diagram approved in conjunction with the equipment familiarization process, unless the Testing Party otherwise agrees.

Paragraph 11 deals with access to the facilities of the Verifying Party. Personnel of the Testing Party are given the right to observe use of equipment by Designated Personnel and to be present in the facilities of the Verifying Party for certain purposes requiring the presence of both Parties under specified restrictions. At all other times, personnel of the Testing Party may enter Verifying Party facilities only at the express invitation of the Designated Personnel Team Leader and when accompanied by him or his designated representative.

Paragraphs 12 and 13 deal with rights of Designated Personnel to obtain photographs of verification activities and to require that an operation that would result in the photographed object being permanently lost to view be held up until adequate photographs are obtained. Limits on the cumulative delay introduced by this right are also specified. Paragraph 13 lists the objects and activities that may be photographed.

Paragraph 14 defines the procedures for recovery of hydrodynamic data, and for transfer of a copy of such data to personnel of the Testing Party.

Paragraph 15 provides that Designated Personnel may not be present in areas from which personnel of the Testing Party have been withdrawn in connection with the test, but have the right to accompany such personnel when they reenter these areas after the test. Paragraph 16 affirms that all hydrodynamic yield measurement activities shall be carried out in accordance with the coordinated schedule.

Paragraph 17 specifies the maximum number of Designated Personnel permitted at the test site for a test of standard configuration, a test of standard configuration conducted in more than one emplacement hole, or a test of non-standard configuration. At least two of the Designated Personnel must be fluent in the language of the Testing Party.

SECTION VI.

Section VI sets forth the procedures, conditions, and rights applicable when the Verifying Party elects to use the seismic yield measurement method.

Paragraph 1 gives the Verifying Party the right to carry out seismic measurements at three Designated Seismic Stations in the territory of the Testing Party. To qualify as a Designated Seismic Station a facility must be located within the continental territory of the Testing Party and must meet specified technical requirements. It must also be chosen from existing stations that provide earthquake and other seismic data, including data on tests, to archives in the territory of the Testing Party that are accessible to the Verifying Party. In paragraphs 2 and 3 the U.S. and the U.S.S.R., respectively, designate three such stations: Tulsa, Oklahoma; Black Hills, South Dakota; and Newport, Washington in the United States; and Arti, Novosibirsk, and Obninsk in the Soviet Union.

Paragraph 4 requires each Party to provide the other with certain information on each of its Designated Seismic Stations upon entry into force of the Treaty. The information includes a site diagram, elevation above sea level and the types of rock on which it is located.

Paragraph 5 provides that a Party may replace one or more of its Designated Seismic Stations, provided that the new station meets the criteria of paragraph 1, and the same information as provided for the original stations is provided.

If the Verifying Party has notified the Testing Party of its intent to use the seismic yield measurement method and carry out verification activities at a particular station, the Testing Party may not substitute a new station for that station less than 90 days prior to the test. Finally, seismic data from the new station must be available in the archives of the Testing Party, accessible to the Verifying Party, covering the period from entry into force of the Treaty (or four years if the substitution is made within four years following entry into force).

Paragraph 6 provides that the Verifying Party may request replacement of any station that does not meet the criteria of paragraph 1. Such a request must set forth the reasons why the Verifying Party believes the existing station does not meet those criteria and must be transmitted to the Testing Party through the Nuclear Risk Reduction Centers. Disputes are to be referred to the Bilateral Consultative Commission. Paragraph 7 requires the Testing Party to bear the costs of replacing a Designated Seismic Station in its territory.

Paragraph 8 requires the Testing Party to provide the Verifying Party at each Designated Seismic Station specified facilities and equipment, meeting agreed technical specifications, related to the installation and operations of seismic verification equipment. The applicable technical specifications are set forth in letters exchanged by the Heads of Delegation during the negotiation of the Protocol, copies of which are attached to this analysis.

Paragraph 9 specifies the rights and obligations of the Testing Party at the Designated Seismic Stations. Its personnel have the right to observe the installation and calibration of equipment by Designated Personnel, but otherwise may not be present except at the invitation of the Designated Personnel Team Leader and when accompanied by a representative of the Verifying Party. The Testing Party is prohibited from interfering with the installation, calibration, adjustment, and operation of the Verifying Party's equipment, and is also obligated to provide agreed-upon assistance and logistical support.

Paragraph 10 grants to Designated Personnel a series of specific rights that cover the activities required to carry out seismic measurements. These include the right to:

(a) confirm that agreed technical specifications for installation and operation of equipment have been met during the time periods specified in the coordinated schedule;

(b) have access to their equipment from the time of arrival of Designated Personnel until their departure from the Designated Seismic Station;

(c) install, calibrate, adjust, and continuously operate their equipment;

(d) record seismic signals and universal time signals continuously from the time their equipment is installed until two hours after the test, as well as process data to monitor the quality of recorded data and retrieve and copy all recorded data;

(e) use their own electrical sources to supply electrical power to their equipment;

(f) install and operate tamper-detection equipment and observe the cableway and the exterior of the facility in which the seismic sensors are installed;

(g) assess the integrity and performance of their equipment and confirm that there has been no interference with seismic measurements and the recording of such measurements; and

(h) lock and seal their facilities at the station.

Paragraph 11 requires that the Testing Party notify the Designated Personnel Team Leader at each Designated Seismic Station of the beginning of the period of event readiness and the planned time of the test, to the nearest one second, in accordance with the count-down provisions set forth in Section IV. The notice must be in writing and referenced to UTC.

Paragraph 12 requires Designated Personnel upon arrival at the station to provide the Testing Party personnel with a description of the recording format and computer program to read digital data if digital recordings are made. This paragraph also requires Designated Personnel, prior to their departure from the station, to provide the Testing Party with a copy of recorded data, a paper graph showing the test data from one minute before until 30 minutes after the test, and the results of calibration of their equipment. They are also obligated to prepare their equipment for inspection and for storage or shipment.

Paragraph 13 gives Designated Personnel the right to acquire, or, if the Testing Party so agrees, take photographs of operations and activities related to seismic verification under conditions similar to those applicable in the case of use of the hydrodynamic yield measurement method.

Paragraph 14 requires all activities of Designated Personnel at Designated Seismic Stations to be carried out in accordance with the coordinated schedule. In addition, Designated Personnel must arrive at least 10 days before the test and leave within two days after the test. If the test is postponed by more than 10 days, they may leave (or be required by the Testing Party to leave) the Designated Seismic Stations. In that case they have the right to seal their equipment, which can then be unsealed only by them, under observation of personnel of the Testing Party. They have the right to reoccupy the station at least 72 hours before the test.

Paragraph 16 restricts the number of Designated Personnel at each station to no more than five. At least one of the Designated Personnel at each station must be fluent in the language of the Testing Party.

SECTION VII.

Section VII sets forth the procedures, conditions, and rights applicable when the Verifying Party carries out on-site inspection.

Paragraph 1(a) requires the Testing Party to provide Designated Personnel with the results of any available studies of rock extracted from holes in the area of the test, and of logging and surveying measurements relevant to geology and geophysics of the emplacement medium.

Paragraph 1(b) gives Designated Personnel the right to conduct specified logging and measurements regarding the emplacement hole or nearby cavities, whether the emplacement hole is vertical or horizontal. All logging data and geometrical measurement data must be duplicated and a copy given to the Testing Party before the Designated Personnel leave the test site, pursuant to paragraph 1(c).

Paragraph 1(d) gives Designated Personnel the right to receive core samples or rock fragments extracted at specified locations from the emplacement hole, in accordance with procedures that give Designated Personnel the right to choose between core samples and rock fragments and to specify the locations of extraction, subject to certain limitations. The amount of rock extracted is also prescribed as is the diameter of the small drilled holes from which the rock is extracted in the case of horizontal emplacement holes. Paragraph 1(e) ensures that the Testing Party makes the decisions as to who actually extracts the core samples or rock fragments. If the Testing Party decides not to do so, or if it does so but the core samples or rock fragments fail to meet the required specifications, paragraph 1(f) guarantees Designated Personnel the right to extract this material using their own equipment. If the Testing Party has cased more than a total of 20 meters of a specified portion of the emplacement hole, paragraph 1(g) guarantees the Verifying Party the right to obtain core samples or rock fragments from an uncased hole that can provide information equivalent to that which the Verifying Party would have received under paragraphs 1(b), 1(d), 1(e), and 1(f). Paragraph 1(g) also specifies the size and location of the uncased hole if a new hole must be drilled. Designated Personnel have the right to retain the core samples and rock fragments extracted as prescribed above, in accordance with paragraph 1(h).

Paragraphs 2(a), (b), and (c) give Designated Personnel the right to observe the emplacement of each explosive canister in a vertical emplacement hole, to measure the depth or location of emplacement in a vertical or horizontal emplacement hole, and to observe the stemming process and confirm that specified requirements have been met. Paragraphs 2(d) through (g) guarantee Designated Personnel access to the test location and to their equipment. Paragraphs 2(f) and 2(g) also specifically provide Designated Personnel the right to conduct a visual inspection of a defined area at the test location.

Paragraphs 3 and 4 give Designated Personnel the right to obtain photographs under the same conditions as those applicable to the use of the hydrodynamic yield measurement method.

Paragraph 5 provides that all on-site inspection activities must be carried out in accordance with the coordinated schedule. However, unless otherwise agreed, the time for logging and coring by Designated Personnel may not exceed 15 days and such activities must be completed at least one day before the beginning of emplacement of explosives. Designated Personnel who only carry out paragraph 1 activities must leave upon completion of those activities, while those who carry out paragraph 2 activities may remain at the test site if required by the coordinated schedule. Designated Personnel who will carry out paragraph 2 activities must arrive at the test site at the time specified in the coordinated schedule, which must be at least three days prior to the date set by the Testing Party for initiating these activities.

Paragraph 6 limits the number of Designated Personnel conducting paragraph 1 activities at any given time to 23. Those carrying out activities described in paragraphs 2(a), 2(b), and 2(c) may not exceed five at any given time. At least one of the Designated Personnel must be fluent in the language of the Testing Party.

SECTION VIII.

Section VIII specifies the equipment that Designated Personnel have the right to import, install, and use in connection with verification activities, and establishes procedures and conditions applicable thereto.

Paragraph 1 establishes the basic rights to import, install, and use equipment more specifically described in subsequent paragraphs for each of three verification methods, as well as common equipment that may be imported, installed, and used in connection with any of the three verification methods. The latter category includes: maintenance and support equipment and spare parts for the other equipment more specifically provided for; certain electrical equipment; locks, seals and sealing equipment; medical and health physics equipment and supplies, protective gear, and recreational items; and office equipment including personal computers and copying and facsimile machines. This paragraph also covers three categories of equipment which the Verifying Party may supply, but only if the Testing Party chooses not to provide it. These three categories are: (1) photographic equipment; (2) closed-circuit television equipment to enable Designated Personnel to observe specified test site operations; and (3) satellite communications equipment to enable Designated Personnel to reach their home country telephone network by satellite from the test site in the territory of the Testing Party.

Since the Verifying Party may be unable to bring all the items that will be required for every verification activity, paragraph 2 contemplates that the Parties will agree in the Coordinating Group on additional items to be supplied by the Testing Party. This paragraph requires the Parties to agree within 15 days on such additional items as temporary structures, materials, and supplies, that the Verifying Party requests. The paragraph requires the Testing Party to provide Designated Personnel with the agreed items, with descriptions and operating instructions, in accordance with the coordinated schedule. The obligation contained in this paragraph on the part of both Parties to agree on additional items assumes a degree of cooperation in the Coordinating Group. Disputes over particular additional items would be resolved in the Bilateral Consultative Commission.

Paragraphs 3, 4, and 5 specify particular types of equipment for hydrodynamic yield measurement, seismic measurements and on-site inspection, respectively. The lists of equipment are not intended to be exhaustive but represent the types of equipment that will be used for each applicable verification activity. Paragraph 6 sets forth the procedures for initial Testing Party familiarization and approval of equipment to be used in connection with any of the three verification methods. Paragraphs 7, 8, and 9 specify the procedures for delivery, inspection, sealing, shipment, and testing of equipment to be used in connection with hydrodynamic yield measurements, seismic measurements or on-site inspection, respectively.

The equipment listed in paragraph 3 is that related to hydrodynamic yield measurements. It includes: sensing elements, cables and transducers; electrical cables; recording facilities and equipment; the command and monitoring facility; trigger conditioner devices; grounding cables; measuring and calibration instrumentation; and logging and other geological equipment. The categories are elaborated with considerable specificity to demonstrate the range and types of equipment that Designated Personnel may bring with them.

Paragraph 4 lists equipment for use in seismic measurement. It includes: specified seismic sensors and signal processing equipment; data recording equipment; equipment for connecting, controlling and calibrating seismic equipment; data processing equipment; and equipment for assessing the validity of recorded data. As in paragraphs 3 and 5 the list is not intended to be exclusive.

Paragraph 5 lists types of equipment associated with on-site inspection. This category of equipment includes, but is not limited to: logging equipment; associated calibration, monitoring and data processing equipment; equipment for extracting core samples and rock fragments; geologists' field tools and kits; and data recording equipment.

Paragraph 6 establishes a basic right of the Testing Party to an initial familiarization inspection of all the equipment that the Verifying Party will use to carry out verification activities. The familiarization process is initiated by the Verifying Party. At least seven days before delivery of equipment to the point of entry for this initial familiarization, the Verifying Party must provide a complete inventory, including instructions for installing and operating the equipment and specified technical information, including block diagrams of the system and its components. It must also indicate which equipment used for carrying out hydrodynamic yield measurements will be removed from its recording facilities and command facility at the test site shortly before the test because it could record sensitive information during the test. Within 45 days following receipt, the Testing Party must either approve the equipment, in writing, or specify the characteristics of any component that it deems inconsistent with its non-intrusiveness, containment, safety or security requirements. Equipment that is unacceptable for those reasons may be modified and resubmitted for approval. Only equipment that has been approved may be used by Designated Personnel. Within 50 days following delivery, the Testing Party must return all the equipment to the Verifying Party at the point of entry in the same condition as that in which it was received.

Paragraph 7 specifies the procedures applicable to equipment to be used to carry out hydrodynamic yield measurements. At least 60 days prior to the beginning of emplacement of cables or emplacement of explosives, whichever occurs first, the Verifying Party must deliver one or two sealed sets of a specified portion of its equipment. Paragraph 7(b) provides that at least 45 days before the beginning of emplacement of sensing elements and cables, the Verifying Party must similarly deliver the rest of the equipment (except for stored equipment). It has the option of delivering either one or two sets of most equipment, but it must deliver two sets of specified sensing elements and cables, electrical cables, trigger conditioners, and command and recording facilities including associated equipment. Paragraph 7(c) requires that all this equipment must be the same as the equipment previously supplied for familiarization and approved by the Testing Party. Paragraph 7(d) requires that at least seven days before delivery, the Verifying Party must provide a complete inventory, specifying which equipment is to be removed from its command and recording facilities shortly before the test.

Paragraph 7(e) deals with the case in which the Verifying Party provides two sets of identical equipment. In this case the Testing Party may select one set for use by Designated Personnel and may inspect the other set for 30 days without the presence of Designated Personnel, with the exception of the specified sensing and electrical cables. Special procedures are established for the inspection of cables since containment standards require that no cables may be placed in a satellite hole unless they meet the containment requirements of the Testing Party. The components of these two cable sets must be combined and randomly rearranged into two new sets which are then divided in the above-described manner. The Testing Party may affix its seals to the set of equipment to be used by Designated Personnel (which must already have been sealed by the Verifying Party) and to one set of the randomly rearranged cables, and may remove the seals of the Verifying Party from the set of equipment to be inspected and the other set of cables randomly rearranged. For continuously gas-blocked cables, Designated Personnel may cut a three-meter segment from each end of the cable.

Some cables are designed to prevent radioactive gas from traveling along the cable, otherwise individual gas blocking devices must be installed. For continuously gas blocked cables, Designated Personnel have the right to cut representative segments of cable and subject them to pressure tests. A different set of procedures is established for cables with individual gas-blocking devices installed: Designated Personnel cut cables at three meters on either side of each gas-blocking device, and the set of devices and connected cable segments is subsequently pressure-tested. The Testing Party is entitled to remove up to 150 meters of cable from the set chosen for inspection, in a number of segments not to exceed two times the number of cables in the set.

Paragraph 7(e) also requires the Testing Party to protect the set of equipment that is to be used by Designated Personnel, and all sealed containers, to store this equipment under agreed conditions, and to ship it undamaged to the test site. The Testing Party is required to consult with Designated Personnel at least 48 hours before shipment, and Designated Personnel have the right to verify the integrity of seals, to observe the equipment and to accompany the shipment. The equipment must arrive at the test site within prescribed times determined by reference to the planned beginning of emplacement of explosives or emplacement of cables. Precise procedures for the removal of seals are set forth, including specific provisions regarding the removal of seals on prescribed cables and trigger conditioners, pressure testing of cables, including cables with gas-blocking devices, and non-destructive inspection of cables. The principal purpose of these procedures is to ensure that the Testing Party's containment requirements are met. Within one day following completion of this testing and inspection, the Verifying Party may require the Testing Party to provide cables that meet Testing Party containment requirements. Those cables must be provided within two days following the request and at least seven days before the planned date of beginning of emplacement of cables.

If the Verifying Party provides only one set of equipment, paragraph 7(f) sets out a similar set of procedures, including the right of the Testing Party to inspect the equipment for 30 days without the presence of Designated Personnel, and the obligation of the Testing Party to ship the equipment undamaged to the test site prior to prescribed deadlines. Within five days of delivery of equipment to Designated Personnel the Designated Personnel Team Leader must either certify that the equipment is in working condition or prepare a damage report. The consequences of damage would be dealt with in the Coordinating Group or, if agreement cannot be reached there, in the Bilateral Consultative Commission.

Paragraph 7(g) requires the Testing Party, after its inspection of equipment, to inform the Verifying Party if any of the equipment does not conform to that previously approved by the Testing Party during familiarization. In such a case the Testing Party must specify the non-conforming characteristics. Non-conforming equipment must be removed and stored under prescribed conditions. Approved equipment is handed over to the exclusive control of Designated Personnel.

Paragraph 7(h) provides that Designated Personnel shall remove from the command facility and each recording facility specified items of equipment, under the observation of personnel of the Testing Party, immediately prior to the final dry run. All remaining maintenance and support equipment and spare parts are required to be removed from these facilities by Designated Personnel upon departure of personnel immediately prior to the test, unless otherwise agreed.

After the equipment has been used, the Testing Party has the right to inspect the equipment for a period of 30 days without the presence of Designated Personnel, at times and in accordance with the specific provisions of paragraph 7(i).

Paragraph 7(j) confers on the Verifying Party the right to store equipment in the territory of the Testing Party at a location chosen by the Testing Party and under its protection.

Paragraph 7(k) provides specific procedures that the Verifying Party may invoke in connection with the preparation of inventories and packing, shipment, and storage of equipment.

Paragraph 7(l) provides for delivery and use of stored equipment for subsequent tests.

Paragraphs 8 and 9 provide comparable procedures, rights, and obligations covering equipment to be used for seismic measurement and on-site inspection, respectively.

SECTION IX.

Section IX establishes the procedures for designating the personnel who will participate in verification activities, ensures their expeditious entry and functioning in the territory of the Testing Party, and accords them the equivalent of diplomatic status while they are in the territory of the Testing Party.

Paragraph 1 provides that not later than 10 days following entry into force of the Treaty, each Party is required to provide the other with a list of proposed Designated Personnel, not exceeding 300 individuals, and a list of proposed Transport Personnel, not exceeding 200 individuals. The lists must contain the name, date of birth, and sex of each individual.

Paragraph 2 provides that the Party reviewing a list must accept or reject a proposed individual within 20 days. Individuals who are rejected must be deleted from the list. Following submission of the original lists, pursuant to paragraph 3, a Party may substitute up to 100 persons per year on its list of Designated Personnel (in addition to substitutions because of permanent physical incapacity, death, or ejection from the country), and an unlimited number on its list of Transport Personnel. All substitutions are subject to the same acceptance procedure as original appointees.

Paragraph 4 provides that following receipt of the original lists each Party must prepare for the issuance of visas and whatever other documents may be required for each individual on each list to carry out his or her functions. Paragraph 4 requires the Testing Party to perform whatever preparatory work may be required so that it will be in a position to issue and deliver multiple-entry visas and any other required documents for Designated Personnel within 15 days of notification that an individual is coming to carry out verification activities for a specific test, as specified in paragraph 2 of Section X.

Paragraph 5 establishes the grounds and procedures for finding an individual unacceptable for continued inclusion on the list of Designated Personnel or Transport Personnel.

Paragraph 6 guarantees the right of Designated Personnel, with their personal baggage and Verifying Party equipment, to enter the Testing Party's territory at the point of entry, to remain in that territory, and to exit through the point of entry.

Paragraph 7 specifies the privileges and immunities accorded Designated Personnel and Transport Personnel while they are in the territory of the Testing Party and, with respect to official acts, thereafter. This paragraph provides the equivalent of diplomatic privileges and immunities for Designated Personnel and Transport Personnel, their living and working quarters, their archives, documents, papers and correspondence, as well as the aircraft and transport vehicles of the Verifying Party. Immunity may be waived by the Verifying Party but only if the waiver is express.

Paragraphs 8 and 9 specify that Designated Personnel and Transport Personnel may not engage in any professional or commercial activity for personal profit in the territory of the Testing Party. Without prejudice to their privileges and immunities, they must respect the laws and regulations of the Testing Party, and may not interfere in its internal affairs.

Paragraph 10 provides that if the Testing Party considers that an individual has abused his or her privileges or immunities, consultations shall be held to determine the facts and to prevent a repetition of such an abuse if it occurred.

SECTION X.

Section X establishes the obligations and procedures relating to the entry, transport, provision of food, lodging, and other services for Designated and Transport Personnel. Paragraph 1 establishes a general obligation on the part of the Testing Party to ensure access and to provide any assistance necessary to enable Designated Personnel to carry out verification activities. In addition, this paragraph specifically guarantees the right of Designated Personnel to be present at the test site and Designated Seismic Stations at whatever times and for whatever periods as may be required to conduct the permitted verification activities. Those times and periods must be specified in the coordinated schedule developed and agreed upon in the Coordinating Group established for the particular test.

Paragraph 2 requires the Verifying Party to provide the Testing Party with specific information at least 20 days before the planned arrival of its Designated Personnel for verification activities. This information includes the names of personnel, including the names of Team Leaders and Designated Personnel who will escort equipment; the point of entry; the scheduled date and estimated time of arrival; and the mode of transportation to be used. The Verifying Party must also submit the passports and required documentation, such as visa applications and photographs, of those Designated Personnel. The Testing Party is then required to return these passports, with visas and any other required documents, within 15 days of receipt.

Paragraph 3 requires the Verifying Party to inform the Testing Party, at least 20 days prior to their planned date of arrival, how many Transport Personnel will arrive at the point of entry and to provide, at least three days before the planned date of arrival, a list of names of Transport Personnel, as well as their passports and required documentation. The Testing Party is then required to return these passports, with visas and any other necessary documentation, no later than one day before their planned arrival.

Paragraph 4 provides that the number of Designated Personnel at a test site or Designated Seismic Station shall be governed by Sections V, VI, and VII. This paragraph also provides that Designated Personnel may not be replaced unless they have been at the test site for at least six consecutive weeks (except in cases of injury, illness or family emergency). They are required to leave the test site or Designated Seismic Stations upon completion of their particular activities as specified in the coordinated schedule.

If the Verifying Party decides to use an aircraft other than a commercial aircraft, paragraph 5 requires that the aircraft proceed along agreed upon airways and under a flight plan filed in accordance with the procedures established by the International Civil Aviation Organization. The Testing Party is required to provide parking and security protection at its expense and fuel and servicing at the expense of the Verifying Party.

Paragraph 6 obligates the Testing Party to do what is necessary to ensure that all necessary approvals and clearances are obtained so that Designated Personnel, their baggage and equipment of the Verifying Party may arrive at the point of entry by the scheduled arrival date and time, while paragraph 7 obligates the Testing Party to assist with customs clearances and to provide transportation to the test site or Designated Seismic Stations so as to enable those personnel to exercise their rights and carry out their functions within the times provided for in the Protocol and the coordinated schedule.

Paragraph 8 gives the Testing Party the right to escort Designated Personnel and Transport Personnel while paragraph 9 establishes that except as otherwise provided in the Protocol, the Designated Personnel and Transport Personnel may travel in the territory of the Testing Party only as authorized by the Testing Party.

Paragraph 10 obligates the Testing Party to provide food, living and working facilities, transportation, and medical services for personnel of the Verifying Party and secure storage places for equipment. If the Verifying Party desires to provide its own food, the Testing Party is obligated to ensure its arrival at the appropriate locations and the use by Designated Personnel of a complete kitchen.

Paragraph 11 deals with medical care for Designated Personnel. It gives the Verifying Party the right to bring a medical specialist, with medications and instruments, and additional portable medical equipment agreed upon by the Parties. That specialist has the right to consult on the recommended treatment of any sick or injured Designated Personnel in a medical facility of the Testing Party, to monitor that treatment, and to order evacuation either to an agreed medical facility in the territory of the Testing Party or to the point of entry. In addition, Designated Personnel are guaranteed the right to refuse any medical treatment prescribed by medical personnel of the Testing Party. That refusal must be express, and the Testing Party is thereupon relieved of any responsibility for the consequences of that refusal.

Paragraph 12 guarantees the Designated Personnel Team Leader or his designated representative access to an international telephone network and to telephone communications between their working and living facilities and the Verifying Party's embassy. In addition, paragraph 13 gives the Designated Personnel Team Leader or his designated representative access to satellite communications via INMARSAT or an equivalent system between the test site and the telephone communications system of the Verifying Party. If the Testing Party does not provide equipment for such access, the Verifying Party may bring its own equipment for that purpose, but installation and alignment must be done jointly, specified equipment must be locked and sealed, and neither Party may have access to that specified equipment except under the observation of the other Party. However, Designated Personnel are entitled to exclusive access to the remote control unit. Finally, the Testing Party may make specified modifications to the equipment, provided the modifications do not degrade the quality of the communications.

Paragraph 14 requires the Testing Party to provide portable radios, access to vehicle-mounted radios and telephones at the test site so that Designated Personnel may communicate with each other between the test site work area and living quarters or in transit between any of these places. The Testing Party is also required to provide telephones for communications between work sites, and between work sites and living quarters at a Designated Seismic Station.

Paragraph 15 requires Designated Personnel to observe all generally applicable safety rules and regulations, and any additional restrictions regarding access and movement that may be established by the Testing Party. Designated Personnel are entitled access only to areas at which they will directly perform their verification functions. In addition, they may not be present at any place without an escort and prior permission of the Testing Party Representative, except those places that are so marked on the diagrams of the test site or Designated Seismic Stations provided to the Verifying Party at the first meeting of the Coordinating Group.

Paragraph 16 prohibits Designated Personnel from seeking or being given access by physical, visual, or technical means to the interior of the explosive canister, to information describing the explosive design, or to equipment for control and firing of the explosive. However, paragraph 16 also provides that the Testing Party may not locate explosive design information in such a way as to impede verification in accordance with the Protocol.

Paragraph 17 prohibits the possession or use by Designated Personnel anywhere in the territory of the Testing Party of any firearms, ammunition, or narcotics that have not been medically prescribed. In addition, they may not use or possess specified items at the test site or a Designated Seismic Station, including photographic, video and sound recording equipment, radio equipment, teleoptical devices, and personal computers, except as specifically provided for in the Protocol.

Paragraph 18 prohibits Designated Personnel from removing air, water, plant or soil samples, rock samples or debris, metal objects, or animals without the written approval of the Testing Party Representative, except as specifically provided in the Protocol. Paragraph 19 guarantees the right of Designated Personnel to remove from the territory of the Testing Party all items, including data, obtained in accordance with the Protocol. Paragraph 20 gives the Testing Party the right to inspect baggage and personal possessions of Designated Personnel upon their arrival and departure from the test site and Designated Seismic Stations, as well as packages received by them at, or sent by them from, these places. All inspections must be in the presence of Designated Personnel.

Paragraph 21 places responsibility on the Verifying Party for all the costs of verification activities set forth in the coordinated schedule, including the cost of specified goods and services requested by and provided to the Verifying Party and the cost of refueling and servicing its aircraft, except for those verification-related costs otherwise provided for by paragraph 22, 23, or 24 or by agreement of the Parties. Paragraph 22 provides that the Testing Party is responsible for all costs related to the preparation of test sites, Designated Seismic Stations, and storage facilities used by Designated Personnel in accordance with the Protocol. Paragraph 23 provides that the Testing Party is responsible for the costs of conducting any reference test and for the costs of drilling or excavating the second and third satellite holes that may be requested by the Verifying Party for a test of non-standard configuration having a planned yield exceeding 50 kilotons. Finally, under paragraph 24, the Testing Party is also responsible for the cost of transporting equipment to and from the sites where it elects to inspect or familiarize itself with the equipment after the equipment has arrived at the point of entry, and the costs of transporting the equipment to and from a storage site.

Paragraph 25 provides that if the Verifying Party notifies the Testing Party of its intention not to go through with previously notified verification activities, the Verifying Party must reimburse the Testing Party for agreed technical and logistical support costs incurred by the Testing Party prior to that time.

SECTION XI.

Section XI establishes the institutional arrangements and procedures for implementing verification activities and for settling questions that may arise in connection therewith. Paragraph 1 establishes a Bilateral Consultative Commission to facilitate implementation of the Protocol. In addition, in paragraph 6, the Parties agree to establish a Coordinating Group under the auspices of the BCC for each test for which verification activities under the Protocol are to be carried out.

The BCC is not established as a standing body, but is to meet at the request of a Party to consider questions relating to implementation of, or compliance with, the TTBT or the Protocol. It may also consider amendments to either of these instruments. It is specifically given authority to consider the implications of new verification technologies having a bearing on the Treaty or the Protocol. Finally, it is empowered to consider certain technical or administrative changes, to seek agreement of the Parties on those matters where such agreement is specifically contemplated by the Protocol, and to seek agreement on verification costs and payment procedures.

Paragraphs 2 through 4 specify that changes in certain time periods, logistical arrangements, and technical verification procedures may be agreed upon in the BCC. Such changes would not be considered amendments of the Treaty. These paragraphs deal with technical, administrative or operational matters that may require adjustment in light of practical experience with verification activities, but which do not implicate the major obligations or policies of the TTBT or the Protocol.

Paragraph 5 obligates the Parties to establish regulations for the BCC through consultation, and authorizes the Parties to amend those regulations.

In paragraph 6 the Parties agree to establish a Coordinating Group of the BCC for each test for which verification activities will be carried out. The BCC is authorized to establish and amend procedures governing the activities of Coordinating Groups.

The Coordinating Group is responsible for coordinating the activities of the Verifying Party with the activities of the Testing Party with respect to the specific test for which the Coordinating Group was established. Paragraph 7 provides that the Coordinating Group shall operate from the beginning of preparation for verification activities until the last departure of Designated Personnel from the territory of the Testing Party.

By virtue of paragraph 8, all members of the Coordinating Group from the Verifying Party must be taken from the list of Designated Personnel. The Representative of the Verifying

Party, who will also be the principal Designated Personnel Team Leader, must be designated simultaneously with the notice of intent to carry out verification activities. Within 15 days of receipt of that notice the Testing Party must name its Representative to the Coordinating Group. Paragraph 9 requires that within 25 days of receipt of notice by the Verifying Party of its intention to carry out verification activities provided for in the Protocol, the first meeting of the Coordinating Group must take place in the capital of the Testing Party. Thereafter, it meets at the request of either Party.

At the first meeting of the Coordinating Group, paragraph 10 requires the Testing Party to present, on the first day of that meeting, a comprehensive list of all its planned activities that could affect the rights of the Verifying Party. The list must be specific and set forth precise times and durations of activities. If the Verifying Party has notified the Testing Party of its intention to carry out hydrodynamic yield measurements or on-site inspection, the Testing Party must provide additional specified information regarding the number and orientation (vertical or horizontal) of emplacement holes, the number of explosions in the test and in each hole, and the emplacement points. In addition, if the Verifying Party has notified the Testing Party of its intention to use the hydrodynamic yield measurement method, the Testing Party is required to provide information as to whether the planned yields of individual explosions in a test including two or more explosions exceed 35, and 50 kilotons, and additional information on emplacement holes, canisters, by-pass and access tunnel cavities, choke sections, and density of certain stemming material with respect to tests of non-standard configuration.

Within 15 days following the convening of the first Coordinating Group meeting, the Verifying Party is required by paragraph 11 to provide a list specifying verification activities that it intends to carry out as well as those that it intends not to carry out. At that same time the Verifying Party is required to provide a preliminary statement setting forth its requirements for technical and logistical support for its verification activities and, in addition, to indicate whether or not it requires the Testing Party to provide specified sensing and electrical cables. If the Verifying Party has notified the Testing Party of its intent to use the hydrodynamic yield measurement method with respect to a test of non-standard configuration, the Verifying Party must also state whether it requires a reference test, and whether it will actually conduct hydrodynamic yield measurements and, if so, which measurements and its detailed satellite hole requirements.

Paragraph 12 provides that within 10 days following receipt of the information specified in paragraph 11 the Parties, within the Coordinating Group, must develop and agree upon a coordinated schedule that ensures the proper exercise of the verification rights provided by the Protocol. The schedule must include precise times and durations for verification activities. Those times and durations must take account of the numbers of Designated Personnel permitted under Sections V, VI and VII of the Protocol.

Paragraph 13 provides that agreement of the Representatives of each Party in the Coordinating Group shall constitute agreement of the Parties for that purpose, except for specified parts of Section III dealing with agreements on specific verification measures in situations where the Testing Party would otherwise be constrained in its operations or prohibited from conducting the test involved, and except for paragraph 2 of Section XII dealing with public release of information.

Paragraph 14 requires each Designated Personnel Team Leader at the test site and each Designated Seismic Station to prepare a factual report in English and Russian upon completion of verification activities, listing those activities, with dates of completion, and attaching lists of all information, photographs, data, and samples received in the course of conducting these activities, as well as a list of supporting technical and logistical activities provided by the Testing Party. Each Designated Personnel Team Leader is required to comment on ambiguities not resolved during the verification activities; the Representative of the Testing Party may respond. Both must sign the report and retain a copy. The report must be completed before the scheduled departure of Designated Personnel from the test site or Designated Seismic Station.

Paragraph 15 provides that the Coordinating Group may resolve issues that arise in the course of verification activities and that require prompt resolution. If the Coordinating Group cannot resolve such an issue, paragraph 15 requires that the issue be referred to the BCC.

SECTION XII.

Paragraph 1 provides that nothing in the Treaty or Protocol affects the proprietary rights of a Party in information provided by it in accordance with the Treaty and Protocol, or in information that may be disclosed to the other Party or that may become known to the other Party in preparing for or conducting a test. Claims to such proprietary rights, however, must not impede implementation of the provisions of the Treaty and the Protocol. Proprietary rights refers to rights such as patent, trademark or copyright protection, as for example, might cover the design of drilling equipment or a geological study.

Paragraph 2 provides that information provided in accordance with the Protocol or material using such information, may be publicly released or published by the Testing Party or by the Verifying Party if the Testing Party so agrees, while public release of the results of observation or measurements made by Designated Personnel may take place only with the agreement of both Parties. These obligations do not prohibit the Verifying Party from making public statements with regard to conclusions on compliance with the obligations of the TTBT that are derived from the results of observation and measurements by Designated Personnel, in contrast to the raw data obtained by such observation and measurements.

Section XIII.

Section XIII confirms that the Protocol is an integral part of the TTBT. Accordingly, it enters into force at the same time as the TTBT and remains in force as long as the TTBT remains in force.

PEACEFUL NUCLEAR EXPLOSIONS TREATY

Preamble

The Preamble to the PNE Treaty contains five paragraphs that set forth the common premises and objectives of the Parties entering into this Treaty.

In the first preambular paragraph the Parties refer to the mandate to negotiate this Treaty set forth in Article III of the TTB Treaty.

In the second preambular paragraph the Parties reaffirm their adherence to the objectives and principles of the Limited Test Ban Treaty, the Non-Proliferation Treaty, and the TTB Treaty, and their determination to observe strictly the provisions of these Treaties.

In the third preambular paragraph the Parties express the desire to assure that underground nuclear explosions for peaceful purposes shall not be used for purposes related to nuclear weapons.

In the fourth preambular paragraph the Parties state their desire that the utilization of nuclear energy be directed only toward peaceful purpsoes.

In the final paragraph of the Preamble, the Parties indicate the desirability of appropriate cooperation in the field of nuclear explosions for peaceful purposes.

Article I

In paragraph 1 of Article I the Parties indicate that they are entering into this Treaty to satisfy the obligations undertaken in Article III of the TTB Treaty and to assume additional obligations in accordance with the provisions of this Treaty.

Paragraph 2 of Article I provides that the PNE Treaty shall govern all underground nuclear explosions for peaceful purposes conducted after March 31, 1976.

Article II

Article II sets forth three definitions to be used for the purposes of the PNE Treaty. The word "explosion" is defined as any individual or group underground nuclear explosion for peaceful purposes and the word "explosive" is defined as any device, mechansim or system for producing an individual explosion. The term "group explosion" is defined as two or more individual explosions for which the time interval between successive individual explosions does not exceed 5 seconds and for which the emplacement points of all explosive can be interconnected by straight-line segments, each of which joins two emplacement points and each of which does not exceed 40 kilometers. This definition was established because teleseismic systems cannot reliably distinguish and measure the yields of individual explosions (in a group) of lesser dimension or shorter time separation.

Article III

In paragraph 1 of Article III, subject to the obligations assumed under this Treaty and other international agreements, each Party reserves the right to carry out nuclear explosions at any place under its jurisdiction or control outside the geographical boundaries of nuclear weapon test sites and to assist in carrying out explosions in the territory of another state, at the request of such state.

Paragraph 2 of article III sets forth the undertaking by each Party not to carry out at any place under its jurisdiction and control or assist in carrying out anywhere individual and group nuclear explosions for peaceful purposes except in compliance with the following yield limitations and stated conditions:

(a) The Parties agree not to carry out or assist in carrying out any individual explosion having a yield exceeding 150 kilotons. Thus, the yield limitation for individual PNEs is identical to that for weapon tests which, as indicated above, resulted from the fact that it has not been possible to develop a basis for assuring that individual explosions with yields greater than 150 kilotons would not provide weapons-related benefits otherwise precluded by the TTB Treaty.

(b) The Parties agree not to carry out or assist in carrying out: (1) any group explosion having an aggregate yield exceeding 150 kilotons except in ways which will permit the identification of each individual explosion and the determination of its yield as provided for in Article IV of and the Protocol to the PNE Treaty; or (2) any group explosion having a yield exceeding one and one-half megatons.

(c) The Parties undertake not to carry out or assist in carrying out any explosion under this provision which does not carry out a peaceful application. In an Agreed Statement associated with this provision the Parties agree that developmental testing of any nuclear explosives (including those intended for peaceful projects) does not constitute a "peaceful application" and any such developmental tests must be carried out only at nuclear weapon test sites pursuant to the TTB Treaty. Thus, the Parties are in accord that the developmental testing of any nuclear explosive must be treated as the testing of a nuclear weapon.

The Agreed Statement also provides that associating facilities, instrumentation or procedures related only to the testing of nuclear weapons or their effects with an explosion carried out pursuant to this Treaty does not constitute a "peaceful application". Therefore, no such test facilities, instrumentation or procedures can be associated with a peaceful nuclear explosion project.

(d) Finally, the Parties agree not to carry out or assist in carrying out any explosion except in compliance with the Limited Test Ban Treaty, the Non-Proliferation Treaty and other international agreements. Some PNE applications that have been contemplated would involve excavation or earth moving operations. This last provision is therefore important because U.S. studies indicate that it does not appear possible to carry out major excavation PNE projects without violating the Limited Test Ban Treaty.

Paragraph 3 provides that, if in the future, either Party believes that individual nuclear explosions having a yield in excess of 150 kilotons could be permitted, this question would be considered by them at an appropriate time which has to be agreed in the future. The negotiating record makes clear that, in order for individual nuclear explosions above the limit of 150 kilotons to be permitted, this Treaty would have to be amended and the amendment submitted to the Senate for advice and consent to ratification.

Article IV

In the first paragraph of Article IV each Party agrees that, for the purpose of providing assurance of compliance with the provisions of the PNE Treaty, they will: (a) use national technical means of verification in a manner consistent with recognized principles of international law as in the TTB Treaty; and (b) provide to the other Party information and access to sites of explosions and furnish assistance, in accordance with the Protocol to the PNE Treaty.

In the second paragraph of this Article the commitment not to interfere is made applicable not only to the utilization of national technical means of verification, as in the TTB Treaty, but also to the implementation of provisions pertaining to information and access to sites and the furnishing of assistance, in accordance with the Protocol to the PNE Treaty.

Article V

Article V provides that the Parties shall promptly establish a Joint Consultative Commission to promote the objectives and implementation of the PNE Treaty. This has a precedent in the provision for the establishment of the Standing Consultative Commission for the SALT ONE agreements in Article XIII of the ABM Treaty and Article VI of the Interim Agreement.

Within the framework of the Joint Consultative Commission (JCC) the Parties will consult with each other, make inquiries and furnish information in response to such inquiries. This is a companion provision to paragraph 3 of Article II of the TTB Treaty.

In the JCC the Parties will also consider questions concerning compliance with the obligations assumed and related situations which may be considered ambiguous. As with the identical provision in Article XIII of the ABM Treaty and in Article VI of the Interim Agreement, this provision gives the JCC a broad mandate to consider any compliance questions that may be raised by a Party. In addition, the Parties could consider questions involving unintended interference with the means for assuring compliance with this Treaty, which are set forth in paragraph 1 of Article IV.

In the JCC the Parties will also consider changes in technology or other new circumstances having a bearing on this Treaty, as well as possible amendments.

The second paragraph of Article V authorizes the Parties to establish regulations for the JCC governing its procedures, composition and other relevant matters.

Article VI

In the first paragraph of Article VI the Parties agree to develop cooperation on the basis of mutual benefit, equality and reciprocity in fields related to underground nuclear explosions for peaceful purposes. The second paragraph provides that the Joint Consultative Commission will consider specific areas and forms of cooperation, and the third paragraph provides that the Parties will appropriately inform the International Atomic Energy Agency of the results of any such cooperation.

Article VII

In the first paragraph of Article VII the Parties agree to continue to promote the development of the international agreement or agreements and procedures for making available on a non-discriminatory basis potential benefits of peaceful applications of nuclear explosions to non-nuclear-weapon States Parties as provided for in Article V of the Non-Proliferation Treaty and to provide appropriate assistance to the International Atomic Energy Agency in this regard. In the second paragraph of this Article, the Parties undertake not to carry out nuclear explosions for peaceful purposes in the territory of a third state unless such third state agrees to the implementation in its territory of (a) the international observation and procedures envisioned by Article V of the Non-Proliferation Treaty and (b) the provisions of Article IV of the PNE Treaty and the Protocol thereto including the provision by that third State of the necessary assistance for such implementation and of the privileges and immunities specified in the Protocol.

Article VIII

The first paragraph of this Article provides that the PNE Treaty shall remain in force for a period of five years and shall be automatically extended for successive five-year periods unless either Party notifies the other of its termination no later than six months prior to its expiration. This parallels the term of the TTB Treaty. Because of the close relationship of the two Treaties, identical duration periods were chosen. This paragraph also provides that neither Party may terminate the PNE Treaty while the TTB Treaty is in force.

As a counterpart to the first paragraph, the second paragraph provides that termination of the TTB Treaty shall entitle either Party to withdraw from the PNE Treaty at any time.

Paragraph 3 of this Article is the amendment provisions. Amendments to the Treaty enter into force in the same manner as the Treaty itself, i.e., upon the exchange of instruments of ratification.

Article IX

The final Article provides that the Treaty and its Protocol which forms an integral part thereof shall be subject to ratification in accordance with the constitutional procedures of each Party and shall enter into force on the day of the exchange of instruments of ratification. It further provides that such exchange of instruments of ratification shall take place simultaneously with the exchange of instruments of ratification of the TTB Treaty, thus bringing both Treaties into force at the same time. As with the TTB Treaty, the PNE Treaty is to be registered pursuant to the United Nations Charter.

June 22, 1990

SECTION BY SECTION ANALYSIS OF THE PROTOCOL TO THE TREATY ON UNDERGROUND NUCLEAR EXPLOSIONS FOR PEACEFUL PURPOSES

The Protocol consists of a preamble and thirteen sections, organized as follows:

Section I.	Definitions
Section II.	Explosion Depth and Composition
Section III.	Verification Measures
Section IV.	Notifications and Information Relating to Explosions
Section V.	Hydrodynamic Yield Measurement Method
Section VI.	Local Seismic Network
Section VII.	On-Site Inspection
Section VIII.	Equipment
Section IX.	Designated Personnel and Transport Personnel
Section X.	Entry, Transport, Food, Lodging and Provision of Services for Designated Personnel and Transport Personnel
Section XI.	Procedures for Consultation and Coordination
Section XII.	Release of Information
Section XIII.	Entry Into Force

PREAMBLE

In the Preamble the Parties confirm the provisions of the Treaty Between the United States of America and Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes (PNET), confirm that nuclear explosions for peaceful purposes are those underground explosions conducted outside national nuclear test sites (a fact that the Protocol takes into account) and state their conviction that effective verification of compliance with the PNET is necessary.

SECTION I.

Section I defines terms whose meanings are constant throughout the Protocol. The introductory sentence incorporates in the Protocol, by reference, the definitions of terms contained in Article II of the PNET. Hence whenever the term "explosion" is used in the Protocol, it refers to any individual or group of underground nuclear explosions for peaceful purposes. Because this term encompasses both individual and group explosions, any provision in the Protocol that refers to the yield of an explosion refers to the yield of an individual explosion or aggregate yield of a group explosion. The term "group explosion" is defined in Article II(c) of the PNET which specifies the time intervals and spacing criteria that are used to distinguish individual explosions from separate explosions that are in such proximity in time and space that they are collectively considered a "group explosion."

1. The term "emplacement hole" is defined as the entire interior of any drill-hole, shaft, adit or tunnel in which an explosive, associated cables and other equipment are installed to carry out an explosion. An emplacement hole may contain more than one explosive.

2. The term "Verifying Party" is defined as the Party entitled to carry out, in accordance with the Protocol, activities related to verification of compliance with the PNET by the Party carrying out an explosion.

3.-4. The terms "Designated Personnel" and "Transport Personnel" are used to mean personnel appointed by the Verifying Party from among its nationals, in accordance with specified procedures, to carry out verification activities in the territory of the Party carrying out the explosion, in accordance with the Protocol, or to provide transportation, respectively.

5. The term "point of entry" is defined as Washington, D.C. (Dulles International Airport) in the case of the United States, and Moscow (Sheremetyevo-2 Airport) in the case of the Soviet Union. The paragraph also contemplates the possibility

that other points of entry may be mutually agreed upon in the Coordinating Group, as for example may be appropriate if an explosion is scheduled at a location for which another airport would be more convenient. The point of entry is the place at which Designated Personnel and Transport Personnel of the Verifying Party and equipment of the Verifying Party must enter and leave the territory of the Party carrying out the explosion.

6. The term "on-site inspection" is used to describe activities specifically provided in the Protocol, carried out by the Verifying Party in the territory of the Party carrying out the explosion for the purpose of independently obtaining data on conditions under which the explosion will be conducted, and for confirming the validity of data provided by the Party carrying out the explosion.

7. The term "hydrodynamic yield measurement method" is used to describe the method whereby the yield of an explosion is derived from on-site, direct measurement of the position of the shock front as a function of time during the hydrodynamic phase of the ground motion produced by the explosion.

8. The term "local seismic network" is used to describe the array of seismic stations and the control point temporarily deployed, in accordance with the Protocol, for the purpose of identifying the number of individual explosions in a specific group explosion.

9-10. The terms "Joint Consultative Commission" and "Coordinating Group" are used to describe the Commission established under Article V of the PNET and a working group established under Section XI of the Protocol, respectively.

11. The term "Nuclear Risk Reduction Centers" means the centers located in Washington and Moscow, established by the agreement between the U.S. and the Soviet Union of September 15, 1987.

SECTION II.

Section II establishes substantive obligations regarding the location of explosions, and reiterates an obligation established under the PNET regarding certain group explosions.

Paragraph 1 sets a minimum depth below the ground surface for each explosion. The minimum depth requirement is based on the planned yield of the explosion and is designed to limit the opportunity of gaining certain weapon-related benefits.

Paragraph 2 reiterates the obligation contained in Article III(2)(b)(1) of the PNET. Group explosions having aggregate yields exceeding 150 kilotons are prohibited unless the Parties agree upon specific procedures to implement appropriate provisions of Sections V and VI of the Protocol so as to permit determination of the yield and identification of each individual explosion in the group. If a Party proposes such a group explosion the Parties would have to develop and agree upon such procedures before the explosion could take place.

Paragraph 3 provides that no explosion with a yield (or planned aggregate yield) over 35 kilotons shall take place in a cavity with a volume exceeding 20,000 cubic meters, unless the Parties agree on specific verification measures with respect to that explosion. As with explosions covered by paragraph 2, the Parties would have to develop and agree on specific verification measures before an explosion could be carried out in a cavity exceeding the prescribed volume.

SECTION III.

Section III establishes the basic verification rights with respect to explosions above a specified yield level, and in that connection clarifies the coverage of the PNET.

Paragraph 1 provides that all nuclear explosions, except those conducted at national test sites and therefore covered by the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests (TTBT) and its Protocol, shall be subject to the PNET and to verification of compliance in accordance with its Protocol. The Verifying Party is accorded the right to use the hydrodynamic yield measurement method to measure the yield of any individual explosion having a planned yield exceeding 50 kilotons and to measure separately the yield of any individual explosion that is part of a group explosion having a planned aggregate yield exceeding 50 kilotons. If the Verifying Party uses the hydrodynamic yield measurement method it also has the right to use a temporarily deployed local seismic network to identify each individual explosion in any group explosion having a planned aggregate yield exceeding 150 kilotons. Finally, the Verifying Party has the right to carry out on-site inspection with respect to any single or group explosion having a planned yield (or planned aggregate yield) exceeding 35 kilotons. Nevertheless, the Verifying Party shall not have the right to on-site inspection with respect to an explosion having a planned yield exceeding 50 kilotons if it elects to use the hydrodynamic yield measurement method for that explosion. Because the PNET and its Protocol apply to all nuclear explosions conducted outside specified national nuclear test sites, the verification rights in Section III extend to all such explosions that meet the specified yield levels.

If a Party were to carry out a nuclear explosion outside its territory, the provisions of the Protocol would fully apply to that explosion. Article VII(2) of the PNET prohibits each

Party from carrying out an explosion in the territory of another state unless that state agrees to the implementation in its territory of, among other things, the provisions of the Protocol. Article VII(2) also prohibits a Party from assisting in, or participating in carrying out, an explosion in the territory of another state unless that state similarly agrees to the implementation in its territory of the provisions of the Protocol. If the provisions of the Protocol could not technically be applied automatically, such as the designation of a point of entry, appropriate adjustments would have to be reflected in an agreement with the third state for implementation of the Protocol with respect to the explosion in its territory.

Paragraph 2 of Section III provides that the Party carrying out an explosion shall bear full responsibility for, and shall have exclusive control over, the conduct of the explosion.

Paragraph 3 provides that Designated Personnel are responsible for the working of their equipment, for participating in such operations as the Party carrying out the explosion may require (such as dry runs) and for recording data at the time of the explosion. The Party carrying out the explosion is not obligated to delay an explosion because of any malfunction of equipment or inability of Designated Personnel to carry out these functions, unless the Party carrying out the explosion has caused the malfunction or inability.

SECTION IV.

Section IV sets forth procedures for providing notifications and information related to specific explosions. It establishes deadlines, procedures, notification and informational requirements, and related rights and obligations. Paragraph 1 requires all notifications to be transmitted through the Nuclear Risk Reduction Centers. Other information provided in accordance with the Protocol may also be transmitted, if appropriate, through these Centers. It is contemplated that all notifications shall be in writing. Paragraphs 2 through 12 establish the requirements governing notifications and provisions of information relating to explosions. The basic structure is as follows:

Time of Notification	Content of Notification
Entry into force (para 2)	Party carrying out the explosion provides notice of whether it plans any explosion over 35 kilotons for the remainder of the calendar year and for the next calendar year.
July 1 (para 2)	Party carrying out the explosion provides notice of whether it plans any explosion over 35 kilotons, and if so, how many in next calendar year.
180 days prior to emplacement of explosive (para 3)	Party carrying out the explosion provides information on the explosion and location.

150 days prior to emplacement of explosive (para 4)	Verifying Party provides notice of its intent regarding verification measures to be used.
60 days prior to explosion (para 6)	Party carrying out the explosion provides specific information on explosion and location.
2 days prior to explosion (para 8)	Party carrying out the explosion provides precise time of detonation.
Within one year following explosion (para 12)	Request may be made by Verifying Party for clarification of information (to be provided by Party carrying out the explosion within 30 days).

Paragraph 2 provides that by July 1 of a given year each Party shall inform the other Party whether or not it intends to conduct any explosion during the following calendar year having a planned yield (or planned aggregate yield) exceeding 35 kilotons, and, if so, how many. On the date of entry into force of the Treaty, each Party will provide that information covering the remainder of the calendar year in which the Treaty enters into force and the following calendar year.

Paragraph 2 also requires that changes in the data provided shall be immediately provided to the other Party.

Paragraph 3 requires the Party carrying out the explosion, at least 180 days prior to the planned date of the beginning of emplacement of the explosive or explosives for every explosion having a planned yield (or planned aggregate yield) exceeding 35 kilotons, to notify the Verifying Party of its intention to carry out the explosion and to provide the Verifying Party with the most accurate available information on the planned date, purpose, location and planned yield of the explosion; the number of explosives, planned date of beginning of emplacement, and planned depth of burial of each explosive; the type of rock in which the explosion will take place (including the depth of the water table); and a description of specific technological characteristics of the project that may affect determination of its yield and confirmation of its purpose.

Paragraph 4 provides that following receipt of the information specified in paragraph 3, and no less than 150 days prior to the planned emplacement date, the Verifying Party must indicate, in a single notification, whether or not it intends to exercise its on-site inspection rights or its hydrodynamic yield measurement rights. The Verifying Party has the right to conduct on-site inspection as provided in Section VII with respect to any explosion having a planned yield (or planned aggregate yield) exceeding 35 kilotons if, with respect to an explosion having a planned yield exceeding 50 kilotons, it does not exercise its right to use the hydrodynamic yield measurement method. The Verifying Party has the right to use the hydrodynamic yield measurement method with respect to any explosion having a planned yield (or planned aggregate yield) exceeding 50 kilotons if it does not exercise its alternative right to on-site inspection. In the case of a group explosion having a planned aggregate yield exceeding 150 kilotons, the Verifying Party has the right to use a local seismic network in connection with its use of the hydrodynamic yield measurement method.

Paragraph 5 provides that if the Verifying Party declares its intention not to conduct the activities described in paragraph 4, it shall forfeit its verification rights unless the other Party provides notice of a change in the location of the explosion by more than one minute of latitude or longitude or in the planned date of the explosion indicated in the initial notification by 60 days or more. Within 30 days of such a change, the Verifying Party has the right to revise its notification pertaining to conduct of verification activities.

If the Verifying Party elects to revise its notification and use the hydrodynamic yield measurement method or carry out on-site inspection, the beginning of emplacement of explosives shall not occur less than 90 days from the date of the Verifying Party's revised notification, unless the Parties otherwise agree. The Party carrying out the explosion shall thereafter provide the Verifying Party with the information that it is required to provide in accordance with paragraph 6 or 7. If the Verifying Party decides not to conduct the verification activities specified by it in its initial notification after technical and logistical support requirements for these activities have been agreed upon in the Coordinating Group, the Verifying Party must reimburse the other Party for the previously incurred costs of such technical and logistical support.

Paragraphs 6 and 7 require the Party carrying out an explosion to provide the Verifying Party with the following information if the latter indicates its intention to use the hydrodynamic yield measurement method or to carry out on-site inspection:

-- the number of explosives; the planned yield of each explosive; the planned depth of emplacement of each explosive with an accuracy of 10 meters; the planned point of emplacement of each explosive to be used in a group explosion relative to all other explosives in the group with an accuracy of ten percent of the distance between that explosive and the nearest other explosive, but in no case with an error greater than 100 meters; and the planned time intervals between individual explosions in each group explosion with an accuracy of 0.1 second;

-- a description of the geological and geophysical characteristics of the site of each explosion that could influence determination of the yield, including the depth of the water table; a stratigraphic (in the case of hydrodynamic yield measurement) or lithologic (in the case of on-site inspection) column above each emplacement point; the position of each emplacement point relative to nearby geological and other features that influenced the design of the project of which the explosion is a part; and the estimated physical parameters of the rock within each hydrodynamic measurement zone;

-- the locations and purposes of facilities and installations that are associated with the conduct of the explosion;

-- the planned date of the beginning of emplacement of each explosive;

-- a topographic chart, with geographic coordinates accurate to one minute of latitude and longitude, covering circular areas of 15-kilometer radius centered above each point of emplacement, at a scale of 1:24,000 or 1:25,000 with a contour interval of 10 meters or less, showing the planned location of each explosive marked on the chart with an accuracy of 50 meters.

-- the planned cross-sectional dimensions of each emplacement hole in each hydrodynamic measurement zone; and

-- the location and configuration of any known cavities larger than one cubic meter within each hydrodynamic measurement zone. In addition, if the Verifying Party notifies the Party carrying out the explosion of its intent to use the hydrodynamic yield measurement method, the following additional information must be provided: the length of each canister in which an explosive will be contained; the dimensions of any pipe or other device that will be used to emplace each such explosive canister; and a description of materials, including their densities, to be used to stem the emplacement hole within each hydrodynamic measurement zone.

Paragraph 8 requires the Party carrying out an explosion to inform the Verifying Party of the planned time of detonation of each explosive, with an accuracy of 0.1 second, at least two days prior to the explosion and to inform the Verifying Party of any subsequent change in the detonation time. No later than 10 days after the explosion the Verifying Party must be informed of the actual detonation time.

Paragraph 9 requires the Party carrying out an explosion to notify the Verifying Party immediately of any change in any information provided under paragraphs 3, 6, or 7 of Section IV. If the Verifying Party has notified the Party carrying out the explosion of its decision to use the hydrodynamic yield measurement method or to carry out on-site inspection, the beginning of emplacement of explosives shall not occur less than 90 days after the notification of any change that requires more extensive verification procedures than would be required on the basis of the initial information, unless an earlier emplacement date has been agreed upon by the Parties. Such changes include: a change in the location of the explosion by more than one minute of latitude or longitude; a change in the number of explosives in a group explosion; a change in the planned explosion yield (or aggregate yield); a change in the purpose of the explosion; or a delay in the planned date of the explosion by more than 90 days.

Paragraph 10 establishes the procedures and constraints applicable to an explosion that is intended to deal with certain emergency situations. An emergency situation is described as one that arises out of an unforeseen set of circumstances and requires immediate action, such that it would be practically impossible to adhere to the 180-day notice requirement set forth in paragraph 3. In such a situation the Party making the decision to carry out an explosion shall notify the Verifying Party of this decision immediately after it has been made and shall describe the circumstances and the planned yield (or planned aggregate yield) of the explosion. Unless otherwise agreed by the Parties, the planned yield (or planned aggregate yield) shall not exceed 100 kilotons and the explosion shall not include more than three individual explosions. The Party carrying out such an explosion is required to provide the Verifying Party with all the information that would normally be provided, to the extent such information is available, after making its decision to carry out such an explosion, and in any event no less than 60 days prior to the beginning of emplacement of explosives.

Finally, the Verifying Party must decide, within 15 days of receipt of notification of an explosion for an emergency purpose, whether to carry out verification of that explosion by means of the hydrodynamic yield measurement method. If it decides to use that method it shall deliver hydrodynamic yield measurement equipment to the point of entry not later than 35 days prior to the planned emplacement date. This equipment must be handed over, in the same condition as that in which it was received, to Designated Personnel at the explosion site for emplacement, installation, and use no less than 20 days prior to the planned emplacement date.

Paragraph 11 gives the Party carrying out an explosion the right to make changes in the schedule of operations related to the conduct of an explosion. However, if the Verifying Party exercises its right to use the hydrodynamic yield measurement method or carry out on-site inspection, the other Party must immediately inform the Verifying Party of any change in the schedule of operations, and shall not carry out the explosion more than five days prior to the planned date of the explosion indicated in the initial notification, unless the Parties otherwise agree.

Paragraph 12 allows the Verifying Party a period of one year to request clarification of any point of information provided. Such clarification must be given in the shortest possible time, but in no event later than 30 days after receipt of a request.

SECTION V.

Section V sets forth the procedures, rights and conditions applicable when the Verifying Party elects to use the hydrodynamic yield measurement method of verification.

Paragraph 1 defines the "hydrodynamic measurement zone" as a cylindrical zone having the same axis as the emplacement hole, extending from at least 7.5 meters below the midpoint of the explosive canister to a point at least 25 meters above that midpoint and with a radius of at least 7.5 meters. The actual size of the zone is directly related to the planned yield of the explosion. In the case of a group explosion there will be a separate zone for each explosive.

Within that zone, Designated Personnel are authorized by paragraph 2 to emplace specified hydrodynamic measurement equipment in the same emplacement hole as that in which the explosive is located. Designated Personnel are required to install sensing elements, associated cables and recording facilities in accordance with instructions previously furnished to the other Party, and under its observation. Personnel of that other Party shall assist in such installation if requested to do so by Designated Personnel. The location of each recording facility and its command and monitoring facility of the Verifying Party is to be determined by agreement of the Parties.

The end of sensing elements and associated cables must be located in the emplacement hole three meters from the surface of the explosive canister closest to the entrance to the emplacement hole, at a location relative to the axis of the emplacement hole agreed upon by the Parties. No more than six sensor channels are permitted for each explosive canister. Each Party is required to measure the distances to the sensors and to exchange these measurements. A Party may not use an explosive canister having a length greater than 10 meters or a diameter greater than three meters without prior agreement of the other Party. This requirement significantly constrains the ability of the Party carrying out the explosion to pursue certain evasion techniques that would take advantage of a relatively large space in the canister not occupied by the explosive device. The Party carrying out the explosion is also required to fill all voids and pipes in the hydrodynamic measurement zone with stemming material meeting specified requirements, depending on length and configuration of the emplacement hole and the number of explosives. While the Party carrying out the explosion bears the cost of stemming the emplacement hole, the Verifying Party is required to bear any additional costs incurred in ensuring that the stemming material density meets Protocol specifications.

Paragraph 3 constrains the conduct of group explosions with respect to which the hydrodynamic yield measurement method is used. The Party carrying out a group explosion is required to take steps regarding emplacement points, detonation sequences and time intervals so that no single explosion interferes with the hydrodynamic yield measurement of any other explosion. If the technological characteristics of a project involving a group explosion having a planned aggregate yield of 150 kilotons or less make it impossible to meet this requirement, the Parties are required to agree on alternative hydrodynamic or other verification procedures before explosives can be emplaced. Pending such agreement the group explosion cannot be carried out. Group explosions having a planned aggregate yield exceeding 150 kilotons, which are also dealt with in Section II, paragraph 2 of the Protocol, are never exempt from the non-interference requirement. Group explosions having a planned aggregate yield exceeding 150 kilotons are prohibited unless the Parties agree on specific procedures to identify each individual explosion and on specific hydrodynamic yield measurement procedures to determine the yield of each individual explosion.

Paragraph 4 gives the Verifying Party the right to confirm the validity of the geological and geophysical information provided it in accordance with Section IV. Accordingly, it may analyze studies, data, core samples, and rock fragments provided by the Party carrying out the explosion. It has the right to observe logging and extraction of core samples or rock fragments from the emplacement hole or from a prescribed exploratory hole, or to extract such samples itself if the other Party does not do so. Designated Personnel have the right to examine the logging data, core samples, and rock fragments and to remove them from the territory of the Party carrying out the explosion.

Paragraph 5 gives Designated Personnel the right to confirm the accuracy of information furnished by the other Party, by direct measurement, by batch sampling, and by field measurements, in accordance with specified procedures. Data, including calibration data, dealing with geological and geophysical site characteristics and with the location and configuration of voids must be duplicated, with a copy provided to each Party.

Paragraph 6 gives Designated Personnel the right to have access to the explosion site and related facilities and structures, as well as to their equipment from commencement of its use (at least 20 days before emplacement of explosives in accordance with Section VIII (8)(d)) until departure of all personnel from the explosion area prior to the explosion. They are entitled to observe the emplacement of each explosive canister, to confirm its depth and location relative to any other explosive canister, and to observe the stemming of the emplacement hole. They are also entitled to observe their measurement equipment by remote closed-circuit television, to observe the explosion, to monitor the integrity of their recording equipment, and to record and transmit data to their command and monitoring facility.

Paragraph 7 requires the Party carrying out the explosion, at the request of the Verifying Party, to produce a timing reference signal prior to the explosion and a zero-time reference signal. The Verifying Party may generate a timing reference signal using the electromagnetic pulse from its hydrodynamic measurement cables if it so chooses. In that event it may transmit, use, and record that signal without intervention by the Party carrying out the explosion.

Paragraph 8 specifies the conditions applicable to the acquisition of photographs by Designated Personnel. The

Verifying Party is entitled to provide the cameras. However, photographs must be taken by personnel of the Party carrying out the explosion as requested by, and in the presence of, Designated Personnel. Designated Personnel may request that a photograph show the size of an object by including a measuring scale provided by the Verifying Party, and may also request that repeat photographs be taken if for any reason they are not satisfied with the original. In particular, Designated Personnel have the right to determine the adequacy of photographs of the emplacement operation before the object being photographed becomes permanently hidden from view. If Designated Personnel are not satisfied, the emplacement operation must not proceed until adequate photographs are produced. However, the cumulative delay from this photographic process may not exceed two hours for each emplacement operation unless the Parties otherwise agree.

Paragraph 9 specifies that Designated Personnel may obtain photographs of the exterior of installations and structures associated with the conduct of the explosion; the emplacement of each explosive canister and stemming of each emplacement hole; geological samples and equipment used in obtaining such samples; emplacement and installation of hydrodynamic yield measurement equipment and cables associated with it; containers, facilities and structures for storing and operating the equipment used by Designated Personnel; and whatever additional verification-related activities of Designated Personnel may be agreed by the Parties.

Paragraph 10 provides that any equipment declared by the Party carrying out the explosion to be unacceptable for use at the time of the explosion must be sealed by both Parties. It is then placed in the custody of the Party carrying out the explosion at a time agreed upon by both sides.

Paragraph 11 provides that Designated Personnel, in the presence of personnel of the Party carrying out the explosion, shall recover data records and prepare two copies, one of which is selected by lot and retained by the Party carrying out the explosion. Designated Personnel retain the other copy, but retain no other data and have no subsequent access to their recording facility and equipment until these are returned to the Verifying Party following inspection by the Party carrying out the explosion, unless the Parties agree to allow such access, in which case it must be under the observation of personnel of the Party carrying out the explosion. Designated Personnel must provide information on sensor location, a description of the recording format used for digital recording of signals, and a sample of the computer program for reading digital data. This program must be handed over upon arrival of Designated Personnel at the point of entry.

Paragraph 12 provides that Designated Personnel shall not be present in areas from which personnel of the Party carrying out the explosion have been withdrawn, during the conduct of the explosion, but shall have the right to reenter those areas at the same time as personnel of the Party carrying out the explosion.

SECTION VI.

Section VI sets forth the procedures, rights, and conditions for the use of a temporarily deployed local seismic network, in conjunction with the use of the hydrodynamic yield measurement method, to monitor a group explosion having a planned aggregate yield exceeding 150 kilotons. Paragraph 1 establishes the basic right to install and use a local seismic network in that situation. Such installation and use must be under observation of personnel of the Party carrying out the explosion. In addition, if Designated Personnel so request, the Party carrying out the explosion is required to provide assistance in such installation and use.

Paragraph 2 limits the area in which the network may be located to an area circumscribed by a circle of 15-kilometer radius centered on the ground surface above each explosive emplacement point and it also limits the number of stations that may be included to the number of individual explosives plus eight. The Verifying Party determines the number of stations, but their specific locations must be agreed by the Parties.

Paragraph 3 specifies that the control point of the network must be installed at an agreed location outside the evacuated area around the explosion site but inside the area encompassing the network itself, unless the Parties otherwise agree.

Paragraphs 4 and 5 provide that installation of the network may begin 20 days prior to the explosion and may operate from the time of installation until three days after the explosion, unless the Parties otherwise agree. Designated Personnel have the right to have access to their equipment in the control point during that period and until five days following the explosion. They may use radio communication for transmission and reception of data and control signals between the control point and the individual stations of the network, under conditions agreed by the Parties, for up to three days following the explosion.

Paragraphs 6, 7, and 8 guarantee Designated Personnel access along agreed routes to the stations and control point of the network, the right to use and retain the topographic map previously furnished to the Verifying Party, and the right to obtain photographs associated with the network under the same procedures as are applicable during use of the hydrodynamic yield measurement method.

Paragraph 9 requires Designated Personnel to provide the original and a copy of prescribed data within five days following the explosion. The Party carrying out the explosion selects one copy in the presence of Designated Personnel, who are entitled to retain the other. The Verifying Party is required to provide a sample of the computer program for reading digital data at the time of Designated Personnel arrival at the point of entry and a description of the recording format. Seismic recordings must include an agreed common time reference and must cover the period beginning at least 30 seconds before the arrival of the first explosion-generated P-wave at any station of the local network and ending no more than three days after the last explosion, unless the Parties otherwise agree.

SECTION VII.

Section VII prescribes the procedures, rights, and conditions governing on-site inspection. On-site inspection may be used for any explosion having a planned yield (or planned aggregate yield) exceeding 35 kilotons, except that for explosions having a planned yield (or planned aggregate yield) exceeding 50 kilotons it may be used only if the Verifying Party does not use the hydrodynamic yield measurement method.

Paragraph 1 gives Designated Personnel the right to analyze relevant studies, data, and specified core samples or rock fragments provided by the other Party, and to utilize their own equipment to log the emplacement hole and take sidewall rock samples from a specified part thereof. All logging data produced by either Party must be duplicated, with one copy to each Party. Designated Personnel have the right to examine and remove from the territory of the Party carrying out the explosion, specified core samples, sidewall rock samples, and rock fragments selected by them.

Paragraph 2 gives Designated Personnel the right to confirm information previously submitted by the Party carrying out the explosion by observing measurements being made by the Party carrying out the explosion and by assessing data obtained, and by making measurements themselves to determine the location and configuration of any voids within each hydrodynamic measurement zone. In addition, Designated Personnel have the right of access to the explosion site, to facilities and structures related to the explosion along agreed routes, and to their equipment from commencement of its use at the explosion site until evacuation of personnel from the site before the explosion. Designated Personnel have the right to observe the emplacement of each explosive canister and the stemming of each emplacement hole, as well as the right to observe the entrance area to each emplacement hole from the time of emplacement of each explosive until evacuation of the area prior to the explosion, and to observe the explosion itself. Paragraph 3 gives Designated Personnel the right to obtain photographs associated with on-site inspection in accordance with the same procedures applicable for use of the hydrodynamic yield measurement method.

SECTION VIII.

Section VIII specifies the equipment that Designated Personnel have the right to import, install, and use in connection with verification activities, and establishes procedures and conditions applicable thereto.

Paragraph 1 establishes the basic rights covering equipment specifically described in subsequent paragraphs for each of the activities related to verification, as well as equipment that may be installed and used in connection with any of these activities. The latter category includes: geologists' field tools and kits, geodetic equipment, topographic survey equipment, equipment for recording of field data, and equipment for rapid photo processing; portable short-range communication equipment with agreed specifications; mobile work stations and temporary facilities; medical and health physics equipment, portable computers and recreational equipment; and satellite communications equipment (if the Party carrying out the explosion does not provide satellite communications equipment for use by Designated Personnel).

By paragraph 2, closed-circuit television equipment is included in the category of permissible equipment. As in the case of satellite communications equipment, the Party carrying out the explosion decides whether to provide such equipment or to permit the Verifying Party to provide it.

Paragraph 3 permits the Verifying Party to provide photographic equipment for use by personnel of the other Party in accordance with the procedures governing the acquisition of photographs applicable in the use of each verification method.

Paragraph 4 provides that additional equipment, agreed upon by the Parties at least 120 days before the planned emplacement date, shall be furnished by the Party carrying out the explosion to the Designated Personnel upon their arrival at the explosion site.

Paragraphs 5, 6, and 7 specify particular types of equipment for hydrodynamic yield measurement, a local seismic network and on-site inspection, respectively. Paragraph 8 specifies the procedures to be followed with respect to that equipment. At least 140 days prior to the emplacement date, the Verifying Party must provide to the Party carrying out the explosion, if it has not previously done so, the equipment and design information, specifications, and operating instructions, relevant to the particular verification activities it has elected to use. The Party carrying out the explosion then has the opportunity to familiarize itself with that equipment and information. No less than 120 days before the planned emplacement date the Party carrying out the explosion must advise the Verifying Party if it has concluded that use of an element of the equipment provided would be inconsistent with its containment or security requirements, in which case it shall specify the modifications required to satisfy its requirements. All the equipment provided must be returned in the same condition as that in which it was received to the Verifying Party at the point of entry at least 90 days before the planned emplacement date.

At least 50 days before the planned emplacement date the Verifying Party is required to provide in sealed containers one set or two identical sets -- at its option -- of the equipment that it intends to use for verification purposes, with the exception of sensing elements and associated cables and equipment for the recording, command and monitoring facilities (if the hydrodynamic yield measurement method will be used) and seismic instruments, equipment for the control point, power supplies, cables and radio equipment (if a local seismic network will be installed) which must be provided in two sets. This equipment must be identical to that previously provided for familiarization, modified in accordance with the containment and security requirements of the Party carrying out the explosion if so required by the Party carrying out the explosion. If equipment is provided in two sets, the Party carrying out the explosion then may select one of the sets for use by Designated Personnel, affix its own seals to the sealed containers, and transport it to the explosion site, ensuring the protection of the equipment throughout the period it is in its territory. The Party carrying out the explosion shall determine the timing of shipment, after consulting with the Verifying Party at least 48 hours in advance of shipment.

Designated Personnel have the right to unimpeded verification of the integrity of their seals, to observe their equipment, to accompany this equipment, and to receive it at the explosion site for installation and use at least 20 days before the planned emplacement date. The equipment shall thereafter remain under the control of Designated Personnel, except that certain seals may not be removed prior to preparation for installation of such equipment.

The set of equipment not chosen for use shall be available for inspection by the Party carrying out the explosion, without the presence of Designated Personnel, for a period ending no more than 30 days following the explosion. It must then be turned over to the Verifying Party in the same condition as that in which it was received at the point of entry.

When the Verifying Party provides one set of equipment, the Party carrying out the explosion has the right to inspect such equipment upon its arrival at the point of entry for up to 30 days without the presence of Designated Personnel. Equipment rejected by the Party carrying out the explosion will not be shipped to the site of the explosion but will be returned to the Verifying Party. The Party carrying out the explosion also has the right to retain up to 150 meters of each type of cable being inspected in connection with the hydrodynamic yield measurement method.

Paragraph 9 requires that Designated Personnel must certify that the equipment delivered to the site of the explosion is in working condition prior to the beginning of emplacement of explosives.

Paragraph 10 establishes the integrity of the facilities used by Designated Personnel by prohibiting access by personnel of the Party carrying out the explosion when Designated Personnel are not present and by allowing access only at the express invitation of, and when accompanied by, the Designated Personnel Team Leader or his designated representative.

Paragraph 10 ensures the right of personnel of the Party carrying out the explosion to observe use of equipment by Designated Personnel, in accordance with specified procedures, and provides access for personnel of the Party carrying out the explosion to facilities of the Verifying Party to participate in activities that require the presence of personnel of both Parties, such as dry runs and data recovery, in accordance with specified procedures.

Paragraph 11 provides that the equipment used for verification be available, on an exclusive basis, to the Party that carried out the explosion for up to 30 days after data recovery, after which the equipment must be returned in the same condition as that in which it was received, to the Verifying Party at the point of entry.

SECTION IX.

Section IX establishes the procedures for designating the personnel who will be involved in verification activities, ensuring their expeditious entry and functioning in the territory of a Party carrying out an explosion, and establishing the equivalent of diplomatic status for them and their activities.

Paragraphs 1 through 3 require each Party to provide the other with a list of proposed Designated Personnel and a list of proposed Transport Personnel, each not exceeding 200 individuals, within 10 days following entry into force of the Treaty. The recipient Party must accept or reject any individual within 20 days and so inform the Party providing the list. Any rejected individual must be deleted from the list. Following submission of an original list, a Party may replace up to 40 Designated Personnel per year (in addition to substitutions due to permanent physical incapacity or death) on the list of Designated Personnel, subject to the same rejection procedure. Paragraph 4 requires the recipient Party to prepare for the issuance of necessary multiple-entry visas and other documents, valid throughout the period of preparation for, and carrying out of, a particular explosion.

Paragraph 5 provides that a Party may strike an individual from the list on specified grounds, and may expel such an individual from its territory.

Paragraph 6 guarantees the right of Designated Personnel, with their baggage and equipment of the Verifying Party, to enter the territory of the Party carrying out the explosion at the point of entry, to remain in that territory and to exit through the point of entry.

Paragraph 7 specifies the privileges and immunities accorded Designated Personnel and Transport Personnel applicable while they are in the territory of the Party carrying out the explosion and, with respect to official acts, thereafter. This paragraph guarantees the equivalent of diplomatic privileges and immunities for Designated Personnel and Transport Personnel, their living and working quarters, their archives, documents, papers and correspondence, as well as the aircraft and transport vehicles of the Verifying Party. Any such immunity may be waived by the Verifying Party but only if the waiver is express.

Paragraphs 8 and 9 specify that Designated Personnel and Transport Personnel may not engage in any professional or commercial activity for personal profit in the territory of the Party carrying out the explosion. Without prejudice to their privileges and immunities, they must respect the laws and regulations of the Party carrying out the explosion, and may not interfere in its internal affairs.

Paragraph 10 provides that if the Party carrying out the explosion considers that an individual has abused his or her privileges or immunities, consultations shall be held to determine the facts and to devise measures to prevent a repetition of such an abuse, if it occurred.

SECTION X.

Section X establishes the obligations and procedures relating to the entry, transport, provision of food, lodging, and other services for Designated and Transport Personnel. Paragraph 1 establishes a general obligation on the part of the Party carrying out an explosion to ensure access and to provide any assistance necessary to enable Designated Personnel to carry out verification activities. In addition, this paragraph specifically guarantees the right of Designated Personnel using the hydrodynamic yield measurement method or on-site inspection to be present at the site of the explosion at whatever times and for whatever periods as may be required to conduct the permitted verification activities. Those times and periods must be specified in the coordinated schedule developed and agreed upon in the Coordinating Group established for that explosion.

Paragraph 2 limits the number of Designated Personnel for various specified activities.

Paragraph 3 requires the Verifying Party to provide the Party carrying out the explosion with specific information at least 20 days before the planned arrival of its Designated Personnel or Transport Personnel. The information includes the names of personnel (with their passports and completed visa applications) including the names of the Designated Team Leader, Deputy Team Leader and Designated Personnel who will escort equipment; point of entry; and scheduled date and estimated time of arrival and mode of transportation to be used. No more than 15 days following receipt of the passports and completed visa applications, the Party carrying out the explosion shall return the passports with visas. If the Verifying Party decides to use an aircraft other than a regularly scheduled commercial aircraft, paragraph 4 requires that the aircraft proceed along agreed upon airways and under a flight plan filed in accordance with procedures established by the International Civil Aviation Organization.

Paragraph 5 obligates the Party carrying out the explosion to do what is necessary to ensure that all necessary approvals and clearances are obtained so that Designated Personnel, their baggage, and equipment of the Verifying Party may arrive at the point of entry by the scheduled arrival date and time, while paragraph 6 obligates the Party carrying out the explosion to assist with customs clearances and to provide transportation to the site of the explosion so as to enable those personnel to exercise their rights and carry out their functions within the times provided for in the Protocol and the coordinated schedule.

Paragraphs 7 and 8 give the Party carrying out the explosion the right to assign escorts to personnel of the Verifying Party, whose movement and travel is at the discretion of the Party carrying out the explosion except to the extent that such movement and travel is guaranteed by provisions of the Protocol.

Paragraph 9 obligates the Party carrying out the explosion to provide food, living and working facilities, secure storage places, and transportation and medical services for personnel of the Verifying Party while they are carrying out verification activities in the territory of the Party carrying out the explosion. It is also obligated to assist the Verifying Party if the latter desires to provide its own food or housing units, subject to specified conditions. Housing units supplied by the Verifying Party are subject to a 30-day inspection before use by Designated Personnel.

Paragraph 10 guarantees the Designated Personnel Team Leader or his designated representative immediate direct communications between the site of the explosion and the embassy of the Verifying Party, and access to a satellite communications link to his own country's telecommunications system.

Paragraph 11 requires Designated Personnel to observe all generally applicable safety rules and regulations, and all other restrictions regarding access and movement, established by the Party carrying out the explosion. Designated Personnel are only entitled to access to areas in which they will directly perform their verification functions.

Paragraph 12 prohibits Designated Personnel from access to the interior of the explosive canister, to information describing the explosive design, or to equipment for control and firing of the explosive. However, paragraph 12 also provides that the Party carrying out the explosion may not locate such information in such a way as to impede verification in accordance with the Protocol.

The costs of verification are allocated by paragraph 13 to the Verifying Party. Those costs may include costs of materials, equipment, leased equipment, transportation and other services, food, living and working facilities, medical assistance and communications. The costs covered by this paragraph cover goods, materials, and services requested by the Verifying Party and provided by the Party carrying out the explosion. Such costs do not cover indirect costs. The rates charged must be the standard or official rates.

Paragraph 14 deals with medical care for Designated Personnel. It gives the Verifying Party the right to bring a medical specialist, with medications and instruments, and additional portable medical equipment agreed upon by the Parties. That specialist has the right to consult on the recommended treatment of any sick or injured Designated Personnel in a medical facility of the Party carrying out the explosion, to monitor that treatment, and to order evacuation either to an agreed medical facility in the territory of the Party carrying out the explosion or to the point of entry. In addition, Designated Personnel are guaranteed the right to refuse any medical treatment prescribed by medical personnel of the Party carrying out the explosion. That refusal must be express, and the Party carrying out the explosion is thereupon relieved of any responsibility for the consequences of that refusal.

SECTION XI.

Section XI establishes the institutional arrangements and procedures for implementing verification activities and for settling questions that may arise in connection therewith.

Paragraph 1 provides that the Parties shall use the Joint Consultative Commission (JCC) established by the PNET to facilitate implementation of the Protocol. In addition, the

Parties agree to establish a Coordinating Group under the auspices of the JCC for each explosion for which verification activities under the Protocol are to be carried out.

Paragraph 2 establishes that the Coordinating Group is responsible for coordinating the activities of the Verifying Party with the activities of the Party carrying out the explosion for which the Coordinating Group was established.

Paragraph 3 provides that the Coordinating Group shall operate from the beginning of preparation for verification activities until the last departure of Designated Personnel from the territory of the Party carrying out the explosion.

By virtue of paragraph 4, all members of the Coordinating Group from the Verifying Party must be taken from the list of Designated Personnel, and the Designated Personnel Team Leader shall be designated along with the notice of intent to conduct verification activities. The Designated Personnel Team Leader is also the Representative of the Verifying Party in the Coordinating Group. Within 15 days of receipt of the notice provided by the Verifying Party, the Party carrying out the explosion must name its Representative to the Coordinating Group. Paragraph 5 establishes that the first meeting of the Coordinating Group must take place within 25 days following that notice in the capital of the Party carrying out the explosion. Thereafter the Coordinating Group shall meet at the request of either Party.

At the first meeting of the Coordinating Group, paragraph 6 requires the Party carrying out the explosion to present a comprehensive list of all its planned activities that affect the rights of the Verifying Party. The list must be specific and set forth precise times and durations of activities. It must cover all activities beginning with the day of the first meeting. At that same meeting the Verifying Party is required to provide a preliminary statement setting forth its requirements for technical and logistical support for its verification activities. Within 10 days of the start of the first meeting, the Parties are required to develop and agree upon a coordinated schedule that ensures the proper exercise of the verification rights provided by the Protocol. It is expected that the schedule will include precise times and durations for verification activities.

Paragraph 7 lists the provisions of the Protocol that contemplate further agreement of the Parties, and it provides that agreement of the Representative of each Party in the Coordinating Group shall constitute agreement of the Parties for that purpose. The provisions involved are operational, administrative, technical, or emergency provisions not affecting the fundamental obligations under the Protocol.

Paragraph 8 provides that upon completion of verification activities the Designated Personnel Team Leader shall prepare a factual report listing those activities and attaching lists of all information, photographs, and data provided or received in the course of conducting these activities. The report must be provided to the Party carrying out the explosion in its capital by the Designated Personnel Team Leader within 15 days of completion of the verification activities.

Paragraph 9 provides that the Coordinating Group may resolve issues that arise in the course of verification activities and that require prompt resolution. If the Coordinating Group cannot resolve such an issue, paragraph 9 requires the issue to be immediately referred to the JCC.

Paragraph 10 implements paragraph 2 of Section II of the Protocol and establishes the procedure applicable when a Party intends to carry out a group explosion having a planned aggregate yield exceeding 150 kilotons. It provides that within 30 days after notification of such intent, the JCC shall be convened at the request of either Party for the purpose of reaching agreement on the specific procedures designed to determine the yield of each individual explosion in the group explosion as well as procedures to identify each individual explosion. Paragraph 2 of Section II and paragraph 10 of Section XI of the Protocol together implement Article III

(2)(b)(1) of the PNET, which permits group explosions with an aggregate yield exceeding 150 kilotons only if the Parties agree on verification measures. The obligations under Article III (2)(b) are independent of the obligation under Article III (2)(a), so that the yield of any individual explosion, either a single explosion or one explosion in a group explosion, may not in any event exceed 150 kilotons absent amendment of the Treaty.

Paragraph 10 also provides that the Party that proposes to carry out such a group explosion may not do so until at least 150 days after agreement on specific verification measures has been concluded.

Paragraph 11 authorizes the JCC to establish and amend procedures governing the activities of the Coordinating Group.

SECTION XII.

Section XII confirms certain proprietary rights in information and restricts the release of information under certain circumstances for the purpose of protecting those proprietary rights.

Paragraph 1 provides that nothing in the Treaty or Protocol affects the proprietary rights of a Party in information provided by it in accordance with the Treaty and Protocol, or in information that may be disclosed to the other Party or that may become known by the other Party in preparing for, or carrying out of, explosions. Claims to such proprietary rights, however, must not impede implementation of the provisions of the Treaty and the Protocol. Proprietary rights refers to rights such as, patent, trademark, or copyright protection, as, for example, might cover the design of drilling equipment or a geological study.

Paragraph 2 provides that information provided in accordance with the Protocol, or material using such information, may be publicly released or published by the Party carrying out the explosion, or by the Verifying Party with the agreement of the Party carrying out the explosion, while public release of the results of observation or measurements made by Designated Personnel may take place only with the agreement of both Parties. These obligations refer to the precise information that is provided in accordance with the Protocol. These obligations do not prohibit the Verifying Party from making public statements with regard to conclusions on compliance with the obligations of the PNET that are derived from the results of observation and measurements by Designated Personnel, in contrast to the raw data obtained by such observation and measurements.

SECTION XIII.

Section XIII confirms that the Protocol is an integral part of the PNET. Accordingly, it enters into force at the same time as the PNET and remains in force as long as the PNET remains in force.

VI. LETTERS FROM PRESIDENTS FORD, REAGAN, AND BUSH

LETTER OF TRANSMITTAL FROM PRESIDENT FORD

LETTER OF TRANSMITTAL

THE WHITE HOUSE, *July 29, 1976.*

To the Senate of the United States:

With a view to receiving the advice and consent of the Senate to ratification, I transmit herewith the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests, and the Protocol thereto, referred to as the Threshold Test Ban Treaty (TTB Treaty), and the Treaty between the United States of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes, and the Protocol thereto (PNE Treaty). The TTBT was signed in Moscow on July 3, 1974 and the PNE Treaty was signed in Washington and Moscow on May 28, 1976. For the information of the Senate, I transmit also the detailed report of the Department of State on these Treaties.

These Treaties together establish procedures for the conduct of all underground nuclear explosions by the United States and the Soviet Union. All nuclear explosions other than underground nuclear explosions are prohibited by the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under

Water (the Limited Test Ban Treaty) of 1963. The TTB Treaty and PNE Treaty are the first agreements since the Limited Test Ban Treaty to impose direct restraints on nuclear explosions by the Parties and, as such, contribute to limiting nuclear arms competition.

These two Treaties represent approximately two years of intensive effort. Negotiation of the TTB Treaty began in the Spring of 1974 and was completed in July of that year. However, the question of the relationship of underground nuclear explosions for peaceful purposes to limitations on nuclear weapon testing was not then resolved. As a result, Article III of the TTB Treaty provided that the Parties would negotiate and conclude an agreement governing underground nuclear explosions for peaceful purposes. Work on the PNE Treaty began in the Fall of 1974 and after six lengthy negotiating sessions was completed in April of 1976.

The TTB Treaty and the PNE Treaty are closely interrelated and complement one another. The TTB Treaty places a limitation of 150 kilotons on all underground nuclear weapon tests carried out by the Parties. The PNE Treaty similarly provides for a limitation of 150 kilotons on all individual underground nuclear explosions for peaceful purposes.

During the negotiation of the PNE Treaty, the Parties investigated whether individual explosions with yields above 150 kilotons could be accommodated consistent with the agreed aim of not providing weapon-related benefits otherwise precluded by the TTB Treaty. The Parties did not develop a basis for such an accommodation, largely because it has not been possible to distinguish between nuclear explosive device technology as applied for weapon-related purposes and as applied for peaceful purposes. The Parties therefore agreed that the yield limitations on individual explosions in the two Treaties would be the same.

The TTB Treaty and the PNE Treaty contain numerous provisions to ensure adequate verification, including some concepts, more far-reaching than those found in previous arms control agreements, which are not only important in themselves but which will have significant precedential value as well. For example, the Limited Test Ban Treaty is verified only by national technical means. The TTB and PNE Treaties add requirements for exchange of specific information in advance to assist verification by national technical means, and the PNE Treaty establishes procedures for on-site observation under certain conditions on the territory of the Party conducting the explosion.

The TTB Treaty provides for an exchange of data on the geography and geology of nuclear weapon test sites as well as the yields of some actual weapons tests conducted at each site. The PNE Treaty requires that the Party conducting any underground nuclear explosion for peaceful purposes provide the other Party in advance with data on the geography and geology of the place where the explosion is to be carried out, its purpose, and specific information on each explosion itself. These requirements are related to the yield of the explosion and become more detailed as the magnitude of the explosions increase.

In addition to the limitation on individual nuclear explosions of 150 kilotons, the PNE Treaty provides for an aggregate yield limitation of 1.5 megatons on group underground nuclear explosions for peaceful purposes. A group explosion consists of substantially simultaneous individual explosions located within a specific geometrical relationship to one another. The Treaty provides for mandatory on-site observer rights for group explosions with an aggregate yield in excess of 150 kilotons in order to determine that the yield of each individual explosion in the group does not exceed 150 kilotons and that the explosions serve the stated peaceful purposes. The Treaty also provides for on-site observers for explosions with an aggregate yield between 100 and 150 kilotons if both Parties agree, on the basis of information provided, that such observers would be appropriate for the confirmation of the yield of the explosion.

The TTB Treaty and the PNE Treaty, taken together as integrated and complementary components of this important limitation on nuclear explosions, provide that very large yield nuclear explosions will no longer be carried out by the Parties. This is one more useful step in our continuing efforts to develop comprehensive and balanced limitations on nuclear weapons. We will continue our efforts to reach an adequately verifiable agreement banning all nuclear weapon testing, but in so doing we must ensure that controls on peaceful nuclear explosions are consistent with such a ban. These Treaties are in the national interest, and I respectfully recommend that the Senate give its advice and consent to ratification.

GERALD R. FORD.

LETTER REQUESTING SENATE ACTION FROM PRESIDENT REAGAN

To the Senate of the United States:

Two treaties between the United States of America and the Union of Soviet Socialist Republics on (1) the Limitation of Underground Nuclear Weapon Tests, and the Protocol thereto, known as the Threshold Test Ban Treaty (TTBT) signed in Moscow on July 3, 1974, and (2) Underground Nuclear Explosions for Peaceful Purposes, and the Protocol thereto, known as the Peaceful Nuclear Explosions Treaty (PNET) signed in Washington and Moscow on May 28, 1976, were transmitted to the Senate by President Ford on July 29, 1976 with a view to receiving advice and consent to ratification. (Senate Executive N, 94th Cong., 2d Sess.) Although hearings were held a year later, the Senate itself has not acted on the treaties. I ask the Senate to consider there important treaties anew in light of developments that have taken place over the last decade.

On August 14, 1986, I transmitted to the Congress a comprehensive study which stated U.S. national security concerns as well as our views on necessary verification improvements to the TTBT and the PNET, in response to the requirements of Section 1003 of the FY 1986 Department of Defense Authorization Act (P.L. 99-145). I am enclosing a copy of this study and commend it to your attention.

The security of the United States and the entire free world, today and for the foreseeable future, depends on the maintenance of an effective and credible nuclear deterrent by the U.S. This is a considerable challenge, in light of continuing efforts by the Soviet Union to undercut the effectiveness of our deterrent. With the support of Congress we have succeeded in meeting this challenge, and together we must continue to do so in the future.

Today I am requesting per my October 10, 1986 letter that the Senate give advice and consent, subject to the condition set out below, to two pending treaties that have significant implications for Western security: The TTBT and PNET. These treaties have the common purpose of limiting individual nuclear explosions to no more than 150 kilotons. The TTBT, which prohibits nuclear weapons tests above 150 kilotons, places significant constraints on the efforts we may undertake in the U.S. nuclear test program to respond to Soviet nuclear and non-nuclear activities aimed at undercutting our deterrent. Hence, it is imperative that we have the necessary provisions that will make the TTBT effectively verifiable and thus assure ourselves that the Soviet Union is fulfilling its obligations and is thereby equally constrained.

Unfortunately, as I have frequently stated and the enclosed study makes clear, the TTBT and PNET are not effectively verifiable in their present form. Large uncertainties are present in the current method employed by the United States to estimate Soviet test yields. I have on several occasions reported to the Congress on the problems with Soviet compliance with the TTBT. Therefore, achieving Soviet agreement to improved verification measures that would provide for effective verification of these treaties has been my highest priority in the area of nuclear testing limitations.

As I stated in my March 14, 1986 letter to General Secretary Gorbachev, effective verification of the TTBT and PNET requires that we reduce the current unacceptable level of uncertainty in our estimates of the yields of nuclear tests. Indeed, leaders in previous Congresses have shared my view that the present large degree of uncertainty in such estimates is unacceptable, as well as my desire for sharp improvements. In this regard, we require—and have conveyed to the Soviets that we require—effective verification through direct, on-site hydrodynamic yield (CORRTEX) measurement of all appropriate high-yield nuclear detonations. Further, I informed General Secretary Gorbachev that, if the Soviet Union would agree to essential verification procedures for the TTBT and the PNET, I would then be prepared to request the advice and consent of the Senate to ratification of the treaties. Ratification of the treaties without such provisions would be contrary to the national security interests of the United States.

As written, the TTBT relies solely on teleseismic detection and yield measurement systems and on inadequate, and unverifiable data exchange. The Soviet Union has apparently had problems in correctly assessing the yields of U.S. nuclear tests. Despite our best efforts, the Soviet Union has so far not accepted our practical proposal for achieving the necessary verification improvement of the TTBT and the PNET. We have not yet found any alternative approach which equals the effectiveness of CORRTEX—we are striving to achieve a yield-estimation accuracy of about 30 percent by this method. We have, nonetheless, advise the Soviets, at three Geneva nuclear testing experts meetings in 1986, that the U.S. is willing to consider any other direct yield measurement method the

Soviets might propose, provided it is at least as capable (in terms of accuracy and non-intrusiveness) as CORRTEX. To date, they have not been forthcoming in proposing or explaining alternative verification techniques that would meet our requirements.

Recognizing the role of the Senate in the ratification process, I am therefore requesting that the Senate give its advice and consent to ratification of the TTBT and the PNET, subject to a condition in the following form:

> The Senate's Resolution of advice and consent to ratification is subject to the condition that the President shall not proceed with ratification of the Treaty on Limitation of Underground Weapon Tests and the Treaty on Underground Nuclear Explosions for Peaceful Purposes until the President has certified to the Senate that the Union of Soviet Socialist Republics has concluded with the United States additional agreements expanding upon the obligations stated in Article II of the Treaty on Limitation of Underground Weapon Tests and including provisons for direct, accurate yield measurement taken at the site of all appropriate nuclear detonations so that the limitations and obligations of these treaties, inter alia the 150 kiloton limit, are effectively verifiable, and until such agreements have been submitted to the Senate, and the Senate has advised and consented to their ratification.

I am hopeful we can reach an agreement with the Soviet Union which will allow me to certify that the treaties are effectively verifiable. I will be prepared to ratify the TTBT and the PNET at such time as the condition cited above has been fulfilled.

Further, I informed the General Secretary in Reykjavik that, once our verification concerns have been satisifed and the treaties have been ratified, and in association with a program to reduce and ultimately eliminate all nuclear weapons, I would propose that the United States and the Soviet Union immediately engage in negotiations on ways to implement a step-by-step parallel program of limiting and ultimately ending nuclear testing.

The steps in this program would take into account our long-standing position that a comprehensive test ban is a long-term objective which must be viewed in the context of a time when we do not need to depend on nuclear deterrence to ensure international security and stability, and when we have achieved broad, deep, and verifiable arms reductions, substantially improved verification capabilities, expanded confidence-building measures, and greater balance in conventional forces.

RONALD REAGAN.

THE WHITE HOUSE, *January 13, 1987.*

LETTER OF TRANSMITTAL

THE WHITE HOUSE, *June 28, 1990.*

To the Senate of the United States:

I transmit herewith, for the advice and consent of the Senate to ratification, the Protocol to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests, and the Protocol to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes (the Protocols). The Protocols were signed at Washington on June 1, 1990. I transmit also, for the information of the Senate, the Report of the Department of State on the Protocols, including section-by-section analyses of the Protocols and letters exchanged by the Heads of Delegation to the Nuclear Testing Talks, which will implement certain aspects of the Protocol to the Treaty on the Limitation of Underground Nuclear Weapon Tests.

The Protocols provide for effective verification of compliance with the Treaty on the Limitation of Underground Nuclear Weapon Tests, signed on July 3, 1974, and the Treaty on Underground Nuclear Explosions for Peaceful Purposes, signed on May 28, 1976 (the Treaties). These Treaties, which limit the yield of nuclear weapon tests and individual nuclear explosions for peaceful purposes to no more than 150 kilotons, were transmitted to the Senate for its advice and consent to ratification on July 29, 1976. The Protocols replace, and should be substituted for, the protocols that were submitted with the Treaties at that time. In addition, the Administration remains committed to the nuclear testing treaty safeguards that were submitted to the Senate in 1987, which are essential to the national security and to the maintenance of a credible nuclear deterrent.

The Protocols represent the successful culmination of several years of effort to provide for effective verification of compliance with the Treaties. Negotiations to develop new Protocols to verify compliance with the limits established by the Treaties began in November 1987 and continued until May 1990, when the Protocols were completed. The Protocols provide for a variety of activities related to verification, including the use of the hydrodynamic yield measurement method. Operational changes in the U.S. nuclear test program, including changes at the Nevada Test Site, which implementation of the verification measures will entail were considered carefully and have been judged manageable and therefore acceptable in the interests of effective verification.

I believe these Treaties are in the national interest. Therefore, I urge the Senate to give early and favorable consideration to the Treaties including their Protocols and to give its advice and consent to their ratification.

GEORGE BUSH.

VII. TEXT OF RESOLUTIONS OF RATIFICATION

THRESHOLD TEST BAN TREATY

Resolved, (two-thirds of the Senators present concurring therein), That the Senate advise and consent to ratification of the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests, signed in Moscow on July 3, 1974, and the Protocol thereto, signed in Washington on June 1, 1990, subject to—

I. The declaration that to ensure the preservation of a viable deterrent there should be safeguards to protect against unexpected political or technical events affecting the military balance; that such safeguards, consistent with national interests and resources, should be an important ingredient in decisions on national security programs and allocation of available resources; and that such safeguards should be as follows:

Safeguard "A"

The conduct, within the constraints of treaties on nuclear testing, of effective and continuing underground nuclear test programs designed to add to our knowledge and improve our weapons in all areas of significance to our military posture for the future.

Safeguard "B"

The maintenance of modern nuclear laboratory facilities and programs in theoretical and exploratory nuclear technology which will attract, retain, and ensure the continued application of our human scientific resources to those programs on which continued progress in nuclear technology depends.

Safeguard "C"

The maintenance of the basic capability to resume nuclear test activities prohibited by treaties should the United States cease to be bound to adhere to such treaties.

Safeguard "D"

In conjunction with an effective verification program, the conduct of comprehensive and continuing research and development programs to improve our treaty monitoring capabilities and operations.

Safeguard "E"

The continuing development of a broad range of intelligence gathering and analytical capabilities and operations to ensure accurate and comprehensive information on worldwide nuclear arsenals, nuclear weapons development programs, and related nuclear programs.

II. The declaration that, mindful of the commitment of the United States, the Soviet Union and Great Britain in the Limited Test Ban Treaty of 1963 and in the Non-Proliferation Treaty of 1968 to seek the discontinuance of all test explosions of nuclear weapons for all time and of the commitment which shall be legally binding on the Parties upon ratification of the Treaty on the Limitation of Underground Nuclear Weapons Tests to "continue their negotiations with a view toward achieving a solution to the problem of the cessation of all underground nuclear weapon tests," the United States shares a special responsibility with the Soviet Union to continue the bilateral Nuclear Testing Talks to achieve further limitations on nuclear testing, including the achievement of a verifiable comprehensive test ban.

PEACEFUL NUCLEAR EXPLOSIONS TREATY

Resolved, (two-thirds of the Senators present concurrent therein), That the Senate advise and consent to ratification of the Treaty Between the United States of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes, signed in Washington on June 1, 1990, and an Agreed Statement relating to paragraph 2(c) of Article III of the Treaty, signed on May 13, 1976.

APPENDIX

1. September 14, 1990, Report of the Senate Select Committee on Intelligence
2. July 9, 1990, letter from National Security Advisor Brent Scowcroft to Senate Foreign Relations Committee Chairman Claiborne Pell
3. July 31, 1990, letter from Senator Pell to the Director of ACDA, Ronald F. Lehman II
4. September 11, 1990, response from Ambassador Lehman to Senator Pell
5. Sepetmber 14, 1990, clarifying letter from Ambassador Lehman to Senator Pell

U.S. CAPABILITY TO MONITOR SOVIET COMPLIANCE WITH THE THRESHOLD TEST BAN TREATY (TTBT) AND THE TREATY ON PEACEFUL NUCLEAR EXPLOSIONS (PNET)

REPORT

of the

SELECT COMMITTEE ON INTELLIGENCE
UNITED STATES SENATE

September 14. 1990.—Ordered to be printed

SENATE SELECT COMMITTEE ON INTELLIGENCE

[Established by S. Res. 400, 94th Cong., 2d Sess.]

DAVID L. BOREN, Oklahoma, *Chairman*
WILLIAM S. COHEN, Maine, *Vice Chairman*

SAM NUNN, Georgia
ERNEST F. HOLLINGS, South Carolina
BILL BRADLEY, New Jersey
ALAN CRANSTON, California
DENNIS DeCONCINI, Arizona
HOWARD M. METZENBAUM, Ohio
JOHN H. GLENN, JR., Ohio

ORRIN HATCH, Utah
FRANK MURKOWSKI, Alaska
ARLEN SPECTER, Pennsylvania
JOHN WARNER, Virginia
ALFONSE M. D'AMATO, New York
JOHN C. DANFORTH, Missouri

GEORGE J. MITCHELL, Maine, *Ex Officio*
BOB DOLE, Kansas, *Ex Officio*

GEORGE J. TENET, *Staff Director*
JAMES H. DYKSTRA, *Minority Staff Director*
L. BRITT SNIDER, *General Counsel*
KATHLEEN P. McGHEE, *Chief Clerk*

U.S. CAPABILITY TO MONITOR SOVIET COMPLIANCE WITH THE THRESHOLD TEST BAN TREATY (TTBT) AND THE TREATY ON PEACEFUL NUCLEAR EXPLOSIONS (PNET)

SCOPE OF THE COMMITTEE'S EFFORT

The Senate Foreign Relations Committee has formal responsibility for reviewing all treaties before they are acted upon by the full Senate. The Senate Select Committee on Intelligence's role is to support this process by providing both the Foreign Relations Committee and the Senate as a whole with its assessment of the monitoring and counterintelligence issues raised by these treaties.

This report is the culmination of more than two years of research and analysis by the Committee regarding the monitoring and counterintelligence issues raised by the two nuclear testing treaties. Along with its active promotion of enhanced monitoring capabilities during the annual intelligence authorization process, the Committee routinely follows arms control negotiations to keep abreast of such issues and then devotes intensive attention to them as agreement becomes more imminent. In October of 1988, when agreement on the new Protocols before the end of the Reagan Administration appeared possible, the Committee commissioned a series of formal, on-the-record briefings for its staff. These briefings were provided in late 1988 and early 1989. A second set of on-the-record briefings was held in July of 1990, after the new Protocols were signed.

The Committee held a series of three hearings later in July, taking testimony from the Honorable Manfred Eimer, Assistant Director of the Arms Control and Disarmament Agency (testifying for ACDA Director Ronald F. Lehman II); Ambassador C. Paul Robinson, Chief U.S. Negotiator at the Nuclear Testing Talks; General Colin Powell, Chairman of the Joint Chiefs of Staff; Major General Gerald Watson, Director, Defense Nuclear Agency; the Honorable John C. Tuck, Under Secretary of Energy; Dr. Victor E. Alessi, Director, DoE Office of Arms Control; Dr. John H. Nuckolls, Director, Lawrence Livermore National Laboratory; Dr. Siegfried Hecker, Director, Los Alamos National Laboratory; Dr. Lawrence K. Gershwin, National Intelligence Officer for Strategic Programs (testifying for Director of Central Intelligence William H. Webster); Dr. John T. Kriese, Chairman, the Director of Central Intelligence's Joint Atomic Energy Intelligence Committee; Mr. Douglas J. MacEachin, Chief, the Director of Central Intelligence's Arms Control Intelligence Staff; Dr. William R. Graham, former Science Advisor to the President; and Dr. Wolfgang K. H. Panofsky, Director Emeritus of the Stanford Linear Accelerator Center. Additional U.S. officials submitted written testimony.

On August 2, 1990, the Committee obtained an on-the-record staff briefing regarding counterintelligence and security issues in the Treaties and U.S. preparedness to meet those challenges and to implement the verification provisions of the Protocols. Briefers at that session included: Brigadier General Roland Lajoie, Director, On-Site Inspection Agency; Mr. Harry B. Brandon, Deputy Assistant Director, Intelligence Division, Federal Bureau of Investigation; Dr. Victor E. Alessi of the Department of Energy; Mr. Jay Stewart, Director, Office of Counterintelligence, Department of Energy; Mr. James Magruder, Assistant Manager for Operations and Engineering, Nevada Test Site; Mr. Ray W. Pollari, Director of Counterintelligence Programs, Department of Defense; and Mr. John J. Bird, chief, the Director of Central Intelligence's Treaty Monitoring Center.

On September 19, 1988, the Committee requested that the Director of Central Intelligence produce a formal document, approved by the National Foreign Intelligence Board, on the ability of the U.S. Government, through cooperative and unilateral means, to monitor Soviet compliance with the two Treaties. This request led first to an analysis published by the Director of Central Intelligence's Joint Atomic Energy Intelligence Committee in July of 1989, and eventually to a National Intelligence Estimate published in July of 1990.

To maximize the usefulness of the National Intelligence Estimate, the Committee asked the Chairman of the Joint Chiefs of Staff to submit to the Director of Central Intelligence his assessment of the levels of Soviet evasion that he would consider militarily significant, and the Secretary of Energy to provide an assessment of the Soviet technical, logistic and programmatic requirements necessary to conduct such evasion. Thus, although the National Estimate is an intelligence document, it is directly relevant to the policy maker and reflects the combined expertise of many agencies in the Executive branch, with input from the National Laboratories.

The Committee has also received numerous responses to questions for the record that were submitted to the Executive branch after its July hearings and briefings regarding the two treaties. The results of these inquiries have been integrated into this report. In addition, the Committee staff has traveled extensively to visit U.S. facilities involved with nuclear tests and nuclear test monitoring: the Lawrence Livermore, Los Alamos and Sandia National Laboratories; the Nevada Test Site; the Air Force Technical Applications Center (AFTAC) facility at Patrick Air Force Base in Florida; and the AFTAC facility at McLellan Air Force Base in California.

Finally, the Committee solicited and obtained the written views of numerous outside experts in arms control, seismology, and nuclear testing fields.

The culmination of this intensive effort is a classified report of over 100 pages, which addresses in detail the verification Protocols, U.S. collection and analytical capabilities, cooperative verification measures, Soviet compliance, evasion scenarios, monitoring judgments, safeguards, counterintelligence issues, and implementation concerns. The following are key unclassified findings from the classified report.

INTRODUCTION TO THE TTBT AND PNET

On June 1, 1990, in Washington, D.C., Presidents Bush and Gorbachev signed new verification protocols for two previously-signed but unratified treaties — the Threshold Test Ban Treaty of 1974 and the Peaceful Nuclear Explosions Treaty of

1976 — that place a 150-kiloton limit on the yield of underground nuclear explosions.

The 150-kiloton limit embodied in the TTBT and the PNET is part of the decades old effort to place restrictions on nuclear testing. In his prepared testimony before the Select Committee on Intelligence on July 19, Ambassador C. Paul Robinson, who negotiated the treaty protocols, stated:

> "You may recall that in the 50's and 60's the U.S. conducted nuclear weapon tests with yields many times greater than 150 kilotons. The Soviet Union conducted tests with even higher yields. Thus, the yield limitation imposed by the Treaties is a significant limitation. The arms control rationale for imposing such a yield limitation was to prevent, or at least restrain, the development of very high-yield weapons."

The Treaty on the Limitation of Underground Nuclear Weapons Tests, more commonly known as the Threshold Test Ban Treaty (TTBT), was signed on July 3, 1974. The new Protocol to the Treaty requires that each party specify the geographic boundaries of each weapons test site, provide certain geological and other data about the site, allow the Verifying Party the right to on-site hydrodynamic shock wave measurements and in-country seismic measurements for tests above 50 kilotons, and allow the Verifying Party to conduct on-site inspections for all tests above 35 kilotons. The TTBT covers all underground nuclear explosions that occur at designated weapons test sites, while the separate PNE Treaty applies to any such explosions away from these sites.

The TTBT provisions do not apply to underground nuclear explosions for peaceful purposes (peaceful nuclear explosions or PNEs) because, at the time it was signed, the Soviets insisted on the right to carry our large-scale PNEs that might require explosions larger than 150 kilotons. The Treaty on Underground Nuclear Explosions for Peaceful Purposes (or Peaceful Nuclear Explosions Treaty — PNET) was signed on May 28, 1976. The PNET provides for the right to carry out multiple, or "group," explosions with a total yield of up to 1,500 kilotons, but only if the yield of any individual explosion involved does not exceed 150 kilotons and if (for group PNEs with aggregate yields above 150 kilotons) the Verifying Party approves of verification procedures for the PNE. All group PNEs with aggregate yields above 50 kilotons must be carried out in such a way that the individual explosions involved can be identified and measured.

The new Protocol to the PNET spells out the procedures to be used to ensure that no individual explosion exceeds 150 kilotons. The most important method involves estimating the yield by using on-site equipment to measure the hydrodynamic shock wave from the explosion of devices above 50 kilotons (or of each explosion in a group PNE with a total planned yield over 50 kilotons). For group explosions with total planned yield over 150 kilotons, a local seismic network would also be used to detect each explosion.

Although the TTBT and PNET are separate treaties, they are intimately linked and have the same basic purpose — to prohibit explosions exceeding 150 kilotons. The U.S. approach to the PNET was based on the presumption that there is no essential distinction between the technology of a nuclear explosive device that would be used as a weapon and one that would be used for a peaceful purpose. For this reason, any TTBT limits on weapons tests had to apply equally to tests for peaceful purposes.

Similarly, the basic monitoring requirement of the TTBT and the PNET is the same — to determine whether explosions with yields in excess of 150 kilotons have occurred. In assessing the U.S. Government's ability to do this, it does not matter whether the explosion in question is considered a weapons test or a PNE.

BACKGROUND TO THE COMMITTEE'S FINDINGS

When the TTBT and PNET were signed in 1974 and 1976, respectively, U.S. policymakers planned to rely on "national technical means of verification" to verify compliance with the TTBT. This meant using sites outside the Soviet Union to record the seismic waves generated by an explosion and then estimating the yield of the explosion based on the size of the seismic signal.

Successive Administrations judged, however, that such means were insufficient to verify Soviet compliance with high confidence, largely because of inherent uncertainties in seismic estimates of Soviet test yields. Moreover, serious concerns arose about possible Soviet violations of the TTBT and the risk of undetected evasion. As a consequence, the Senate did not provide its advice and consent to ratification and the Executive branch worked to improve its monitoring capabilities and, since the mid-1980's, to develop new verification Protocols to the Treaties.

In recent years, U.S. Government experts have gained increasing knowledge of the geology of the Soviet test sites, have developed new analytical methods and have calibrated their seismic efforts with on-site measurements, all of which have reduced their uncertainties and resulted in lower seismic estimates of the yields of current and past Soviet tests. In addition, the new verification Protocols to the Treaties address both the uncertainty problem associated with estimating nuclear yields and the risks of Soviet evasion.

With regard to the uncertainty problem, on-site inspection will provide geological data that are crucial to the analysis of how well seismic signals will be generated and transmitted from an explosion site. In-country seismic monitoring will improve U.S. collection of regional seismic signals, although this may make only a minor contribution to U.S. monitoring confidence. On-site (hydrodynamic) monitoring will provide an independent and, generally, a more accurate estimate of explosive yield, which will reduce the uncertainty in "all-source" estimates of yield and also contribute to the refinement of seismic equations, thus lowering the uncertainty attached to yield estimates that are based only on seismic data.

The Protocols will also make evasion much more difficult. Thus, on-site inspectors will be able to detect the use of large cavities or porous material to reduce the size of the seismic signals emitted by a nuclear explosion. This means that any evasion scheme using those methods would have to depress the apparent yield of an explosion to near 35 kilotons, rather than merely to near 150 kilotons — a much more daunting challenge. On-site hydrodynamic monitoring similarly protects against evasion, by forcing the evader to contend with more than just seismic monitoring. A scheme that might reduce a test's apparent yield in seismic monitoring will be fruitless unless it can either depress the apparent yield to near 50 kilotons or also fool the hydrodynamic monitors that measure the shock wave as close as 35 feet from the explosion.

Several other Protocol provisions are specifically designed to thwart evasion: a limit on the size of cavities for nuclear tests; limits on closely-spaced nuclear tests; local seismic monitoring of group PNEs with a declared aggregate yield over 150 kilotons, to detect any undeclared explosion; and the requirement that the Verifying Party agree to verification measures for any group PNE with that large a declared aggregate yield.

There will still be some uncertainties in U.S. monitoring, although U.S. experts could not think of a reason why the Soviets would want to engage in the minor violations of the 150-kiloton limit that exploitation of those uncertainties (without a major evasion effort) would — with some risk — permit. There are also still evasion scenarios that one could envision (as described in this report), although they are much more time-consuming, costly and risky than without the new Protocols. Finally, there may well be means of evading the 35-kiloton and 50-kiloton trigger levels, if the only goal of the Soviets is to avoid U.S. access to a test that exceeds those limits but is still well below 150 kilotons.

KEY FINDINGS AND RECOMMENDATIONS

Basic Monitoring Judgments

1. As a result of the cooperative monitoring and inspection measures negotiated with the Soviets and recent improvements in U.S. analytical methodologies, the overall U.S. capability to monitor Soviet compliance with the 150-kiloton limits in the Threshold Test Ban Treaty (TTBT) and the Peaceful Nuclear Explosions Treaty (PNET) has been significantly improved.

2. The Committee concludes that unilateral U.S. capabilities and the cooperative measures provided for in the verification Protocols are sufficient to monitor Soviet compliance with the 150-kiloton limits.

3. The Soviets could conduct tests slightly above the 150-kiloton limits without the U.S. Government being certain that they had done so. The Soviets could not evade the 150-kiloton limits by a significant amount, however, without a lengthy, costly and risky covert evasion effort.

4. It will be more difficult to monitor Soviet compliance with the 35-kiloton and 50-kiloton "trigger levels" for on-site inspection and hydrodynamic or in-country seismic monitoring. These trigger levels will still serve their primary purpose, however, of making any major evasion of the 150-kiloton limits a much more daunting task for the Soviets.

Soviet Incentives to Comply or to Evade

5. The primary motivations for Soviet evasion would be to conduct full-yield tests to validate the performance, reliability or safety of old or new weapons, or to preclude U.S. knowledge of Soviet exotic weapons programs.

6. These motivations are offset by Soviet reliance on proven nuclear weapon designs; by the fact that most nuclear testing needs can be met by tests under 150 kilotons; by the high costs of covert evasion; by the uncertainty that any evasion scenarios would work as intended: and by the risk of detection by the United States or revelation by an increasingly open and anti-nuclear Soviet press and society. The cost, risk and uncertainty factors would all increase if more than one illegal test were attempted.

Evasion Scenarios

7. Although the motivations and risks described above did not lead any Executive branch witnesses to expect the Soviet Union to attempt any evasion of the Treaties, the following evasion scenarios were presented as examples of the most feasible approaches:

> a. The Soviets could attempt an unannounced 300-kiloton explosion in a large cavity to reduce the seismic signal generated by the explosion, and thus the estimated yield, to near the 35-kiloton trigger level for on-site inspection. Covert construction of such a cavity would be a major activity costing hundreds of millions of dollars, requiring years to create and still running the risk of being detected.
>
> b. Because the TTBT Protocol does not restrict the timing or separation of any tests below 35 kilotons, the Soviets could conduct multiple tests that would degrade seismic estimates of yield. Multiple-explosion evasion scenarios appear more feasible regarding the trigger levels than for any significant evasion of the 150-kiloton limit.
>
> c. Testing in deep space, a violation primarily of the Limited Test Ban Treaty of 1963, is the only technically feasible method of completely concealing the occurrence of a large nuclear explosion. The Soviets would not only have to fly a nuclear payload and testing equipment deep into space and be willing to pay the cost, but would also have to develop an adequate cover story for the mission and for their retrieval of testing data at a time when they are increasingly open about their scientific space missions.

Past Soviet Compliance

8. Given current U.S. Government estimates of the yields of past nuclear tests, the Committee can rule out any major Soviet violation of the 150-kiloton limits of 1976. The pattern of past Soviet testing is consistent with either of two other hypotheses: Soviet compliance with the 150-kiloton limit; or a few slight violations of it. The military rationale for slight violations remains in doubt.

9. The inability of the U.S. Government to determine whether the Soviets had or had not violated the 150-kiloton limits was sufficient reason for the United States to negotiate more stringent verification protocols.

Implementation and Counterintelligence

10. The Executive branch has made sensible decisions on organization and policy for implementing the verification Protocols, analyzing the resulting data, producing monitoring estimates and reaching verification judgments.

11. There is a threat of Soviet intelligence exploitation of the inspection process, including efforts to compromise the secrecy of U.S. nuclear weapons and defense programs and to target U.S. inspectors in the Soviet Union.

12. No comprehensive interagency risk assessment has yet been completed. The risks at the Nevada Test Site and at potential locations for housing Soviet inspectors have not been fully evaluated, partly because not all relevant Executive branch elements have participated adequately in the assessments.

13. The Executive branch has not yet resolved major issues of funding for implementation and counterintelligence. While the President could postpone exchanging instruments of ratification until funds for implementation are available, the mere availability of funds will not guarantee that the several agencies involved will have the needed counter- intelligence resources in place before the first inspection occurs.

Protocol Changes

14. The TTBT Protocol contains not only the basic monitoring rights, but also other provisions affecting monitoring capabilities that are essential for effective verification. They include those that specify data to be provided by the Testing Party; assure the reliability of CORRTEX monitoring; set the criteria for "standard" nuclear tests; and list the permitted activities and equipment of inspectors and monitors.

15. The TTBT Protocol also contains provisions that are essential for effective counterintelligence. They include provisions requiring the use of anti-intrusiveness devices and giving the United States the right to escort Soviet personnel at all times; to control the travel and contacts of Soviet personnel; to examine any equipment brought to the United States; and to inspect the baggage, personal belongings and packages brought or mailed by Soviet personnel.

16. These provisions are subject to change by the Bilateral Consultative Commission established pursuant to paragraphs 2-4 of Section XI of the TTBT Protocol. Executive branch statements thus far do not provide sufficient assurance that changes in such essential provisions will be subject to the advice and consent of the Senate.

Recommendations

1. The Executive branch should provide firm assurances that any changes in the TTBT Protocol regarding provisions that are essential for effective U.S. monitoring, counterintelligence or security — such as those listed above — will be treated as amendments to the Protocol that are subject to the advice and consent of the Senate. The Committee recommends that a condition to the instrument of ratification be enacted to buttress those assurances.

2. The Executive branch should also assure the Senate that it will provide the Senate Intelligence Committee prior notice of any other proposed change in the TTBT Protocol that may have a negative impact on U.S. monitoring, counterintelligence or security capabilities, to enable the Committee to voice an objection in appropriate cases, before the issue becomes moot. The Committee recommends that a condition to the instrument of ratification be enacted to protect the interests of all relevant Committees of the Senate.

3. The Parties agree, in paragraph 3 of Article I of the TTBT, to "continue ... negotiations with a view toward achieving a solution to the problem of the cessation of all underground nuclear tests." The Committee did not consider whether the United States should negotiate further constraints on nuclear tests, but supports further research into technologies that may contribute to verification of compliance with any new obligations the United States may undertake.

4. The Executive branch should complete a comprehensive risk assessment immediately. In conjunction with that assessment, relevant agencies should inform the Intelligence Committees of their plans for effective counterintelligence and security countermeasures.

5. The Committee recommends that a condition to the instrument of ratification be enacted requiring that the President not exchange instruments of ratification until he certifies to the Senate that sufficient resources and time are available to prepare for TTBT implementation, including counterintelligence and security countermeasures.

ADDITIONAL VIEWS OF SENATOR JOHN GLENN

I fully support the findings and recommendations of the Senate Select Committee on Intelligence (SSCI) report on the Threshold Test Ban Treaty (TTBT) of 1974 and the Peaceful Nuclear Explosions Treaty (PNET) of 1976, and I commend the Committee for its thorough and balanced assessment of the monitoring and counterintelligence aspects of these treaties.

I would like to express some additional views not only on the TTBT and the PNET, but on the issue of additional limitations on nuclear testing as well.

My first concern relates to the nuclear testing Safeguards. The Safeguards of the Limited Test Ban Treaty (LTBT), which bans nuclear tests in the atmosphere, in outer space, and underwater, represent conditions by the U.S. Senate to the ratification of that treaty in August 1963. These Safeguards originated when the Joint Chiefs of Staff (JCS) concluded that the military risks inherent in the LTBT were acceptable only if adequate Safeguards were established. The purpose of these Safeguards is basically to hedge against Soviet violation or abrogation of the treaties by maintaining a U.S. capability to respond with actions in the nuclear testing and weapons development fields. When President Bush transmitted the TTBT and PNET verification protocols to the Senate for its advice and consent earlier this year, he reaffirmed his support for the Safeguards and is seeking Senate endorsement of the Safeguard regime for these treaties.

I am a strong supporter of the contingency planning that is embodied in the Safeguards. Recent disclosures, however, have raised doubts in my mind about the continued need for one of these Safeguards — the so-called "Safeguard (c)." Safeguard (c) mandated the maintenance of the facilities and resources necessary to promptly institute nuclear tests in the atmosphere should they be deemed essential to our national security or should the treaty or any of its terms be abrogated by the Soviet Union.

It is now widely recognized that nuclear weapons tests conducted in the atmosphere pose significant health and environmental risks. The Senate recently passed legislation providing compensation for people exposed to fallout from weapons testing in Nevada. In the Marshall Islands, where the U.S. exploded some 66 tests, the health and environmental legacy is still unfolding with tragic consequences.

The Marshall Islands medical program was integrated into this test readiness safeguard in 1982, raising serious policy and management questions. This integration resulted in the effective deregulation of radiation health and safety policies in the Marshall Islands. Fortunately, Energy Secretary James Watkins has recognized this problem and is taking steps to correct it.

I believe that a comprehensive evaluation of Safeguard (c) should be undertaken to determine its continued relevance. This evaluation should include an assessment of the costs of resuming atmospheric nuclear testing, an assessment of the health and environmental impacts of resumed atmospheric testing, and an assessment of whether circumstances could ever arise under which atmospheric testing could be deemed essential to our national security.

In addition, I believe it is important to place these two treaties in their broader arms control context. Both the PNET and the TTBT, which place a 150 kiloton (kt) limit on the yield of U.S. and Soviet underground nuclear tests, are an interim step toward the ultimate goal of attaining a complete ban of all nuclear tests. Final Senate action on the TTBT and the PNET will represent the only tangible results of the effort to attain the ultimate goal of a Comprehensive Test Ban Treaty (CTBT) since negotiation of the Limited Test Ban Treaty (LTBT) in 1963.

Over the years, I have joined with many of my colleagues in the Congress in calling upon the President to request Senate ratification of the TTBT and the PNET, and to resume negotiations toward conclusion of a Comprehensive Test Ban Treaty. I am pleased that these treaties will at long last be acted upon by the Senate. Paragraph 3 of Article I of the TTBT commits the superpowers to "continue their negotiations with a view toward achieving a solution to the problem of the cessation of all underground nuclear weapon tests." I hope that with Senate ratification of the TTBT and the PNET, the U.S. and the Soviet Union will immediately engage in serious negotiations to further limit and ultimately cease nuclear testing in the near future.

At issue in the debate over limiting and ultimately terminating nuclear testing is whether such additional restrictions are desirable from a national security standpoint. A comprehensive test ban (CTB) would result in precluding deployment of nuclear warheads that are significantly different from those currently in our inventory; curtail modifications to nuclear warheads; constrain deployment of nuclear delivery systems by impeding warhead design; and prevent deployment of future generation nuclear weapons. In short, a nuclear test ban would place qualitative (as opposed to quantitative) limits on the nuclear arms race. Coupled with quantitative reductions in nuclear warheads by the superpowers, I believe a CTB will go a long way toward reducing the threat of nuclear war.

I believe that a comprehensive test ban would also serve to enhance our nation's long-standing interest in preventing the proliferation of nuclear weapons to other nations. The proliferation of nuclear weapons is one of the most ominous national security threats facing the U.S. today. Iraq's attempt earlier this year to obtain trigger devices to aid its nuclear program, and the growing threat of war between India and Pakistan (both of which have nuclear programs and delivery systems of great concern to the U.S.), underscore the gravity of this problem. A U.S.-Soviet nuclear test ban, leading to a multilateral test ban, would help to establish a global norm of "non-testing" that would raise the political cost of acquiring nuclear weapons. This non-testing standard could well tip the balance against proliferation in key nuclear threshold states.

The preamble to the Treaty on the Non-Proliferation of Nuclear Weapons, also known as the Non-Proliferation Treaty (NPT) recalls the LTBT of 1963 to "...seek to achieve the discontinuance of all test explosions of nuclear weapons for all time and to continue negotiations to this end..." The NPT comes up for renewal in 1995, and under Article VI of the Treaty the nuclear weapons states are committed to pursue "effective measures relating to the cessation of the nuclear arms race at an early date."

The NPT will only be renewed if a majority of its parties conclude that the Treaty continues to promote their national security interests. If the superpowers continue to rationalize their respective nuclear weapon modernization programs by arguing that modernization rather than restraint is necessary for their national security, a growing number of Third World nations are certain to justify their pursuit of a nuclear weapon capability on the same basis. Such an outcome would not only undermine efforts to broaden non-proliferation controls, but could erode the current non-proliferation regime. In short, a Comprehensive Test Ban Treaty is widely perceived as a prerequisite for preventing the emergence of additional nuclear weapon states as well as preserving the NPT regime.

What is the best approach for attaining a CTBT? For a number of years, I have advocated an approach recommended by seismologists Paul G. Richards and Allan Lindh who have put forward what I believe to be a realistic approach toward attaining a Comprehensive Test Ban Treaty. This would involve the superpowers first negotiating a Low-Yield Threshold Test Ban Treaty. Such a treaty would require that the U.S. and the Soviet Union not conduct nuclear tests with yields in excess of approximately 15 kilotons, and would require them to commit themselves to lowering this threshold in stages over a period of several years. (With the establishment of a sufficient number of in-country monitoring facilities, many experts believe that the uncertainties of estimating the yields of nuclear tests at 15 kilotons are not likely to be much different than they are for the 150 kiloton threshold of the current threshold treaty). Additionally, the superpowers would commit themselves to reaching a very low yield of 1 kiloton in the foreseeable future. A Comprehensive Test Ban Treaty would be the ultimate goal of such negotiations.

A staged "test down" treaty leading toward a CTB would address uncertainties about verification. In-country monitoring under this approach would allow both the U.S. and Soviet Union the opportunity to build up a needed data base of seismic information about each other. Concrete demonstration of monitoring capabilities would be made prior to a decision to move to a lower threshold in order to ensure that each threshold reduction would result in a still-verifiable treaty.

I believe that the approach I have outlined for attaining a Comprehensive Test Ban Treaty with the Soviet Union is both reasonable and responsible. As the superpowers make a renewed effort toward attaining this important goal, I hope that this approach is seriously pursued.

Finally, I would note that the TTBT and the PNET are the first of a series of arms control agreements that will require Senate advice and consent within the next few years. These agreements will provide an important measure of predictability and stability to the superpower relationship — but only if monitoring concerns are adequately addressed.

These arms control agreements will undoubtedly be far more complex than either the TTBT or the PNET and will therefore present formidable monitoring challenges. Enormously expensive intelligence systems that are necessary to monitor Soviet compliance with these agreements constitute the hidden cost of arms control. If these essential intelligence capabilities are sacrificed to narrow budgetary considerations, our ability to adequately monitor these agreements will be placed at risk — endangering our nation's security as well as the public's support of the arms control process.

As the Administration approaches the conclusion of additional arms control agreements with the Soviet Union, I hope it is taking into account the need for a robust research and development program for arms control monitoring technologies — as well as the need for a robust budget to pay for these technologies.

THE WHITE HOUSE
WASHINGTON

July 9, 1990

Dear Mr. Chairman:

This is in reply to the recent letter to the President from you and a number of your colleagues concerning the Administration's policy on follow-on negotiations of further nuclear testing limits.

The just-signed verification protocols to the Threshold Test Ban and Peaceful Nuclear Explosions Treaties are an important step in the area of nuclear testing -- a step which will permit us to seek ratification of the treaties that were negotiated so long ago.

As you know, these protocols establish extensive on-site presence at the test site by the verifying country. They involve complex yield-measurement techniques using electronic instruments in the immediate vicinity of the test. The President believes that the unprecedented nature and complexity of these verification provisions require that we gain some experience with them as a guide to the character of the most appropriate next steps toward further limitations on testing. This approach is based on the simple proposition that we should learn how well the just-agreed verification regime works as a necessary foundation for making or accepting proposals which build on it.

The President is firm in his commitment to the step-by-step process and to a Comprehensive Test Ban as a long-term objective of the United States. We are convinced, however, that so long as the United States must rely upon nuclear weapons for deterrence, we must also have a sensible test program. Recent revelations regarding safety of certain nuclear warheads underscore the importance of testing, both as a vehicle for detecting possible weaknesses in weapons safety and in devising appropriate corrective measures for any such weaknesses. To do otherwise would create uncertainty as to the safety of the stockpile, and render us unable to make safety improvements and unable to react to new threats. This could tend to erode stability, not enhance it.

As we put into practice the new verification protocols, the United States will be ready to propose negotiations on possible further limitations that make sense from a national security standpoint, contribute to stability, and still guarantee a reliable, safe, and effective deterrent.

As you know, we have forwarded the new protocols to the Senate to begin the ratification process. Early action by the Senate will permit prompt implementation of these important treaties and enable us to begin the "step-by-step" process.

Sincerely,

Brent Scowcroft

Brent Scowcroft

The Honorable Claiborne Pell
Chairman
Senate Foreign Relations Committee
United States Senate
Washington, D. C. 20510

CLAIBORNE PELL, RHODE ISLAND, CHAIRMAN
JOSEPH R. BIDEN, JR., DELAWARE
PAUL S. SARBANES, MARYLAND
ALAN CRANSTON, CALIFORNIA
CHRISTOPHER J. DODD, CONNECTICUT
JOHN F. KERRY, MASSACHUSETTS
PAUL SIMON, ILLINOIS
TERRY SANFORD, NORTH CAROLINA
DANIEL P. MOYNIHAN, NEW YORK
CHARLES S. ROBB, VIRGINIA
JESSE HELMS, NORTH CAROLINA
RICHARD G. LUGAR, INDIANA
NANCY L. KASSEBAUM, KANSAS
RUDY BOSCHWITZ, MINNESOTA
LARRY PRESSLER, SOUTH DAKOTA
FRANK H. MURKOWSKI, ALASKA
MITCH McCONNELL, KENTUCKY
GORDON J. HUMPHREY, NEW HAMPSHIRE
CONNIE MACK, FLORIDA
GERYLD B. CHRISTIANSON, STAFF DIRECTOR
JAMES P. LUCIER, MINORITY STAFF DIRECTOR

United States Senate
COMMITTEE ON FOREIGN RELATIONS
WASHINGTON, DC 20510-6225

July 31, 1990

The Honorable Ronald F. Lehman, II
Director, United States Arms Control
and Disarmament Agency
Washington, D.C. 20451

Dear Ambassador Lehman:

I want to thank you for the very helpful presentation you and other executive branch witnesses made on July 17 before the Committee on Foreign Relations with regard to the two new verification protocols to the Threshold Test Ban and the Peaceful Nuclear Explosions Treaties.

As I have reviewed the record of that hearing and started planning for the Committee consideration of the Treaties and Protocols in early September, two matters occur which require clarification.

First, I would appreciate your affirming that your testimony in explanation of the meaning of the Treaties and the obligations they entail, along with that of other Executive branch witnesses and materials submitted for the record, can be regarded as authoritative, and that the Senate can expect the Executive branch to regard itself as bound to interpret and implement the Treaties in accord with these representations without the need for the Senate to incorporate such interpretations in its resolution of ratification.

This affirmation would necessitate that the Administration identify any instance in which an Executive branch witness's testimony is not authoritative and any discrepancies that may exist between the testimony given by its representatives and the testimony of representatives of previous Administrations concerning the obligations of the United States under the two Treaties.

Second, I conclude that it is necessary to have the Administration's written clarification of the areas of permissible modification contemplated by paragraphs 3 and 4 of Section XI of the Protocol to the Threshold Test Ban Treaty. This would ensure that changes to the Treaty and Protocol requiring Senate advice and consent would be treated according to constitutional requirements.

I expect the Committee to recognize that there is a need for an expedited modification of purely technical matters in the cases of highly detailed agreements such as the Protocol. However, the Committee's report will make it clear that the Committee will allow modification only on a case-by-case basis. The Committee would expect the Administration to inform it of any proposed modification under this procedure. This will enable the Committee to voice an objection in appropriate cases, before the issue becomes moot.

Please let me have your response, including the necessary affirmation and clarification, at your earliest convenience.

With every good wish.

Ever sincerely,

Claiborne Pell
Chairman

UNITED STATES ARMS CONTROL AND DISARMAMENT AGENCY
WASHINGTON

DIRECTOR

1 1 SEP 1990

Dear Mr. Chairman:

I write in response to your letter of July 31, 1990 requesting clarification of two matters relating to the Committee's consideration of the Threshold Test Ban Treaty (TTBT) and the Peaceful Nuclear Explosions Treaty (PNET).

First, with respect to the testimony of Administration witnesses received by your Committee during consideration of these two Treaties, I can affirm that the Senate should regard explanations of the meaning of the Treaties and the obligations they entail as authoritative, and that the Senate can expect the Administration to interpret and implement the Treaties in accord with such explanations. With respect to testimony on these Treaties given by previous Administrations, we are unaware of any substantive differences that we would have with such testimony as it relates to interpretation of the Treaties, and we will be happy to comment on any specific statements that you may have in mind.

Second, with respect to the modifications or changes contemplated by paragraphs 3 and 4 of Section XI of the TTBT Protocol, I can confirm that the intention of these paragraphs is to enable the Parties, on the basis of their day-to-day experience in living with the Protocols, to make such changes, of a technical, administrative or procedural nature as do not affect substantive rights and obligations under the Treaty and Protocol, that will improve the effectiveness of the verification regime. Any change of a substantive nature that would have an effect upon basic aims of the Treaty or rights and obligations of the Parties would have to be made by means of an amendment.

The Honorable
Claiborne Pell
Chairman
Committee on Foreign Relations
United States Senate

It is the expectation of the Administration that implementation of the Treaties and their Protocols will include continuing consultations with the Senate. Briefings should be a matter of course. Any proposed amendment would be the subject of specific consultations and, following negotiation, would be subject to advice and consent.

Sincerely,

Ronald F. Lehman II

Ronald F. Lehman II

UNITED STATES ARMS CONTROL AND DISARMAMENT AGENCY
Washington, D.C. 20451

THE DIRECTOR

September 14, 1990

Dear Mr. Chairman:

I write in further response to your letter of July 31, 1990, concerning questions that have arisen prior to mark-up of the resolution of ratification to the nuclear testing treaties.

I would like to provide the following further assurance concerning paragraphs 3 and 4 of Section XI of the TTBT Protocol. The Administration will provide notice concerning any modifications and changes negotiated with the Soviets to the provisions of the TTBT Protocol prior to such modifications or changes becoming binding on the Parties. The objective of this further assurance is to provide notice before an issue becomes "moot."

The Administration offers this further assurance because of the unique technical nature of the TTBT Protocol. The Administration does not consider this further assurance to be a precedent for other arms control agreements with similar provisions that may be concluded in the future.

Sincerely,

Ronald F. Lehman II

Ronald F. Lehman II

The Honorable
Claiborne Pell
Chairman
Committee on Foreign Relations
United States Senate

APPENDIX

---

1. September 14, 1990, Report of the Senate Select Committee on Intelligence
2. July 9, 1990, letter from National Security Advisor Brent Scowcroft to Senate Foreign Relations Committee Chairman Claiborne Pell
3. July 31, 1990, letter from Senator Pell to the Director of ACDA, Ronald F. Lehman II
4. September 11, 1990, response from Ambassador Lehman to Senator Pell
5. Sepetmber 14, 1990, clarifying letter from Ambassador Lehman to Senator Pell

○